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**Intergovernmental negotiating committee
to prepare a global legally binding instrument
on mercury
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Item 3 (b) of the provisional agenda*

Work to prepare for the entry into force of the Minamata Convention on Mercury and for the first meeting of the Conference of the Parties to the Convention: matters required by the Convention to be decided upon by the Conference of the Parties at its first meeting

Review of comments received on the guidance on best available techniques and best environmental practices by the group of technical experts on air emissions

Note by the secretariat

At its third meeting, the group of technical experts on air emissions agreed to circulate the draft guidance on best available techniques and best environmental practices for comment. The compiled comments were considered by the group of technical experts at its fourth meeting. The results of that consideration are set out in the annex to the present note, as provided by the technical experts without formal editing.

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* UNEP(DTIE)/Hg/INC.7/1.

Annex

Comments on BAT/BEP documents

Country	**Document reference**	Comment	Response
Burundi	General	The technologies are not used in Burundi.	Noted
Canada	General	Some revision/strikethrough text remains	Addressed
Canada	General	More diagrams illustrating variations of different equipment/processes	Additional diagrams included where appropriate
Canada	General - question	"Question – the addition of bromine is mentioned for furnaces to capture Hg in some documents. Are Br emissions of any concern (ozone depleting)?"	The issue of bromine is addressed within the text.
Canada	General	Some inconsistencies exist in terms of table/figure titles appearing before/after the figure itself.	Noted, and inconsistencies addressed
Canada	General	Insert summaries of the BAT&BEP in tabular form at the end of each chapter for easy reference and comparison	Addressed on a sector by sector basis
Canada	General	Membership of the expert committee that developed the documents is not discussed. Their jurisdiction and stakeholder membership was not represented.	The expert group is a subsidiary body of the INC, and was established by the Conference of the Plenipotentiaries. It is not common practice to publish the membership group details within the guidance.
Canada	General	Calling for additional focus on the limits of the mercury control techniques, especially in the introductory section.	Further information on control levels feasible with control technique included
Canada	General	Some parts require language editing	Addressed
Canada	General	There appears to be a focus on US, European and Japanese reference methods. While Environment Canada's protocol is mentioned for mass balance monitoring, no other Canadian reference methods were referred to. Consider including Canadian reference method for Ontario Hydro testing from ASTM method cited.	Addressed on a sector by sector basis, and additional references included where available and appropriate
Canada	General	The proposed BAT-BEP identified in the document vary significantly in terms of effectiveness and implementation costs. Some of these measures, such as scrubbers, should not be considered a BAT-BEP, and should be identified as a potential type of control instrument being part of a future policy framework.	Techniques presented, along with methodology to select BAT/BEP at the national level, are consistent with the definition of BAT & BEP contained in Article 2 of the Convention
China	General	Suggest cost calculation units in guidance should be kept consistent.	Cost calculations maintained in source units as it was considered impractical to convert the costs to a common currency or date.

Country	Document reference	Comment	Response
Iran	General	Guidance is useful, but in addition a more detailed guidance manual would be needed at the national level. Also advice on selection of international and regional institution who could provide equipment and training.	Noted, but such detailed guidance was outside the mandate of this group.
Iran	General	Techniques are well described, but applicability for developing countries (financing, availability of technology) is not clear	Noted, and additional information included where available.
Norway	General	Suggest including a list of relevant abbreviations to the beginning of each section	Abbreviations defined within the text
Norway	General	Suggest including further details on the upgrade of existing Hg control systems in all sections	Noted and included where applicable
CREPD	General	The completeness of the processes and techniques included in the guidelines and the comprehensiveness of their description are well addressed, however, the potential usefulness of the draft in guiding Parties in selecting and implementing BAT and BEP in their circumstances is not fully addressed because while controlling or reducing mercury emissions from point sources (facilities listed in Annex D of the Convention); it is critically important to equally address the releases to soil and water that are secondary sources of mercury emissions to the atmosphere. If this is missing, Parties may just take measures to address exhausted gases and neglect how the mercury-contaminated ash residues are disposed in environmentally sound manner.	Issue of cross-media contamination is addressed. Management of residues resulting from pollution control is addressed.
ZMWG	Introduction sections 1.3.2 and 1.3.3 and costs section of each chapter.	Modify / complement: "Costs **and benefits** of mercury control technologies" Information on the benefits of avoided hg emissions to the environment, public co-benefits of controls should be considered. This is in line with the objectives of the Minamata Convention (Article 1) based on human health and environmental protection and the definition of BAT (Article 2 (b) point ii). Only costs to operators of sources for installing hg controls are considered, which is a one sided presentation of the picture around mercury controls. Public benefits (environmental + health protection) and benefits for the operators need to be presented in the relevant sections as well. The policy makers have agreed that the Minamata Convention should bring wider benefits, not just costs. Data is available for various sources. a) Industrial facilities (covered under the EU PRTR system) The European Environment Agency has established average damage costs per tonne of mercury emissions in their recent report on the Costs of air pollution from European industrial facilities 2008 – 2012 at 910,000 EUR_{2005} per tonne, specific to the trans-boundary transport of air pollution, population densities and purchasing power in Europe. http://www.eea.europa.eu/publications/costs-of-air-pollution-2008-2012. A methodology calculating health benefits of reduced	The benefits of mercury control are common to all the source categories, and hence it was considered appropriate to address them in a general section included in the Introduction rather than to repeat the information in each sector chapter.

Country	Document reference	Comment	Response
		mercury emissions to air and water should include an economic valuation of IQ point losses avoided even for low exposure levels, adjusted for national purchasing power. Figures for the average health economic benefit of € 13,579 per IQ point loss at seven years of age, and for the life time economic losses from mercury exposure, exists for the EU, based on US data (Bellanger et al. Environmental Health 2013, 12:3 http://www.ehjournal.net/content/12/1/3). b) Large coal-fired power stations (290 facilities) The EEB/Greenpeace assessed the health impacts due to tighter air pollution standards, including on what it would mean if the EU would implement a tighter hg limit for coal LCPs. The study is available here http://www.eeb.org/index.cfm/library/eu-health-impacts-technical-report/ The cost figures do also consider potential benefits of co-benefits of controls on other pollutants (NOx, PM and SO2). The US EPA has also made some useful benefit calculations in the MATS rulemaking which should be considered.	
Canada	Case studies	Figure numbering starts at 7	Addressed
China	Case studies (General)	Suggest aligning the length, style and structure of case studies from different sectors.	Case studies are presented as received, however case studies are not considered part of the guidance for formal adoption.
China	Case studies (General)	Suggest inclusion of Chinese case studies (details to be submitted by Chinese experts)	Information submitted has been compiled
Iran	Case studies	Include case study on coal-fired power plants.	Information submitted has been compiled
Singapore	Waste, 3.6.2; Case studies	Suggest including the example of Switzerland using acid waste water to treat fly ash in the case studies section.	Information submitted has been compiled

Introduction			
Canada	Introduction/Coal	Occasional inconsistencies, e.g. discussion on corrosive potential for halogen-based oxidizing additives in the Coal section but not in the Introduction	Addressed
Canada	Introduction, 1.1 or 1.2	Consider including description on (a) identifying the target audience/s of the guidance document (b) rationale for the selection of 5 source categories listed in Annex D	The guidance has been presented in a manner that is useful for a variety of potential audiences. . Source categories are as presented in Annex D
China	Introduction	Suggest that either the domestic or the international emission value could be considered as the requirements of using BAT.	Methodology for selecting BAT is described in introduction.
China	Introduction	Suggest adding text: "***It should be noted that the techniques described in this chapter should be updated along with the further development or improvement of technologies***"	The group recognized that the document would require updating to address new techniques, and the dynamic nature of the guidance is reflected in the text.
China	Introduction	Suggest adding clear definition of "emerging techniques".	Addressed on a section by section basis.
CREPD	Introduction section 1.7	There is no text on cross cutting consideration on waste management. It would be co-benefit for the Minamata Convention to transpose and adapt the excellent text on POPs waste management from the Stockholm Convention's BAT/BEP guidelines	Specific reference to Technical Guidelines developed by the Basel Convention is included
ZMWG	Introduction, section 1.7.1, in the first paragraph after the definitions,	Extend last sentence as follows: "The use of BAT to control, and where feasible to reduce emissions, is required for new sources as defined in para 2(c) of Article 8 and is one of several measures which a Party should use for existing sources as defined in para 2(e) of Article 8 **in order to achieve reasonable progress in reducing emissions over time as per para 6 of Article 8"**. (*Rationale: This text reflects the wording of the Minamata Convention highlighting the general objective to achieve reasonable progress in reducing emissions over time.)*	As the full text of article 8 is included in the introduction. this extended wording was not included here.

ZMWG	Introduction, section 1.7.1, fourth/fifth paragraph	Modify: "This guidance is intended to support Parties in selecting and implementing BAT for **new and existing sources, including emission limit values associated with BAT/BEP. The techniques described are generally applicable to the sector as a whole and are economically and technically viable control options, as are the emission levels associated with BAT/BEP.** **This guidance shall be used when selecting and implementing BAT for individual sources, it may be complemented by other updated information, where appropriate. It applies to any relevant source as defined in this Convention.** "	Revised during editing process
ZMWG	Introduction, section 1.7.1, paragraphs on the 1-5 steps approach	Detailed comments on the stepwise guidance. Step 1: Establish information about the source, or source category. This may include, but not be limited to, information on the **desired outputs**, processes, ~~feedstocks or fuels~~ **input materials** and on the actual or expected activity levels including throughput. Other relevant information could include the expected life of the facility, which is likely to be particularly relevant when an existing facility is being considered, and any requirements or plans for controlling other pollutants. **Alternative methods of providing the same intended outputs should be considered in light of the overall protection objectives of the Convention or other relevant Treaties."**	Included some proposals in step 1 text. Group considered that the final section was outside the mandate of the group.
ZMWG	Introduction, section 1.7.1, paragraphs on the 1-5 steps approach	**(new) Step 2:** Identify the full range of options ~~of~~, **including alternative methods of providing the intended outputs of the source under consideration, the** emission control techniques **relevant for the source under consideration and associated cross-media impacts,** including the techniques described in section 1.7.2 of this introduction **describing common generic techniques,** and in the chapters on specific source categories ~~of this guidance~~ **which follow.** *Rationale: As per previous comment, a more comprehensive life cycle approach should be promoted which would also consider alternative methods or providing the intended societal need. The requirement to carefully assess cross-media effects in the decision-making process should be explicitly mentioned, which is implicit in the BAT definition.*	Group considered that the inclusion of alternatives was outside its mandate- Editorial changes during discussion addressed other points.
ZMWG	Introduction, section 1.7.1, paragraphs on the 1-5 steps approach	**(new) Step 3 (merged with Step 4) : "**~~amongst these,~~ Identify **a list of** available control techniques, **select the control technique options which are the most effective to prevent, and where that is not practicable, to reduce emissions of mercury and releases of mercury to air, water and land and the impact of such emissions and releases on the environment. These should achieve a high general level of protection of the environment as a whole (all environmental media should be considered from an integrated approach).** *Rationale: (step 4 is merged with step 3. As per the requirement of the Minamata Convention, the 'most effective' available technique(s) for delivering the intended*	Not agreed. Group decided to keep steps 3 and 4 separate to distinguish between identification of available techniques and selection of most effective techniques

		objective of the Convention should be implemented. The Convention recognises that pollution prevention is preferred over control techniques as per Article 2 (b) of the Convention, which should be reflected in the introductory text.	
ZMWG	Introduction, section 1.7.1, paragraphs on the 1-5 steps approach	**(new) Step 4 (previous step 5):** "Then determine ~~which of these options can be implemented under economically and technically viable conditions taking into consideration costs and benefits, based also on the consideration that they are accessible to the operator of the facility as determined by that Party.~~ **the levels of environmental performance that needs to be achieved by the operator through the use of BAT/BEP that are consistent with the guidance under clear reference conditions that are enforceable and verifiable, with clear timeline for compliance. Monitoring and enforcement tools should then be laid down to ensure the performance levels are met.** The need for good maintenance and good operational control of the system to maintain achieved performance over time should be taken into account." *Rationale: The sector guidance documents reflect BAT/BEP which are judged generally applicable and therefore recognised as technically and economically viable to the sector. This point needs to be explicitly reflected in the introductory text also for reasons of harmonised implementation and level playing field for industry. It is not sufficient to just set levels of performance without any tools put in place to enable verification that these levels are met over time which should be specified. An explicit requirement to provide for monitoring tools as well as timescale for delivering 'reasonable progress in reducing emissions over time' reflects the requirements of the Minamata Convention text. All these parameters need to be duly considered by the Parties.*	Not agreed. The focus on the guidance is to assist in the selection of the best available techniques.
ZMWG	Introduction, section 1.7.1,	**After** "The mercury capture can be enhanced by adding oxidizing agents (i.e. halogens) to the flue gas or by using impregnated activated carbon with halogens" ***Add*** **"The issue of PBDD/Fs formation in the ash when Bromine is added for ACI should be taken into consideration and subject to further monitoring requirements"**	Issue of halogen addition is addressed throughout the document.
NRDC	Introduction, section 1.7.1 steps:	Revise text, adding bolded text or deleting strikeout text, as follows: Step 4: "…from these, select the control technique options which are the most effective to control and where feasible reduce emissions of mercury and to achieve a high general level of protection of **human health and** the environment as a whole." Step 5: "…determine which of these options can be implemented under economically and technically viable conditions taking into consideration costs and benefits and that they are accessible to the operator of the facility as determined by the Party concerned. **Note the options selected can often differ for new and existing facilities, since more stringent controls are often technically and economically viable at new facilities.** The need for good maintenance and good operational control of the techniques to maintain achieved performance over time should be taken into account."	Human health reference are included. Reference to the difference in options for new and existing facilities is included.

China	Introduction, 1.7.2 (Table 1)	Suggest adding the specific conditions in which dust concentrations after cleaning are achieved.	Conditions are included in reference document.
ZMWG	Introduction table 2	*Modify (the values reported)* *It is not clear what is meant with "carbon filters." If fixed bed or moving bed filters are meant here the mercury content after cleaning would be much lower.* *The performance of such filters is comparable with the performance of "Injection of brominated activated Carbon+ dust separator", therefore the value of 0.01* mg/m^3 *is too high. It should be changed to 0.001* mg/m^3. *The same goes with sulfur impregnated carbon filters. The carbon in such filters can be impregnated with sulfur as well as with bromine. The value of 0.010* mg/m^3 *is too high. It should be changed to 0.001* mg/m^3. *With carbon injection and dust separation reduction efficiencies of 90% and more are available. Therefore the mentioned value of 0.05* mg/m^3 *is much too high. Even with the combination of an ESP with carbon injection values below 0.01* mg/m^3 *are achievable It should be changed to 0.01* mg/m^3.	Values included are as presented in referenced source.
China	Introduction, 1.7.2	Suggest listing additional emission reduction techniques in this section (to be submitted by Chinese expert)	No additional information on techniques was received.
United States	Introduction, Section 1.7.2	Wet scrubbers are presented only in the context of 'dust scrubbers' Suggest adding reference to removal of acid gas.	Addressed
Freeport McMoran	Introduction, 1.7.2	*"The most commonly used techniques for dust abatement are bag filters, electrostatic precipitators (ESP) and ~~dust~~* ***wet*** *scrubbers."*	Addressed
Freeport McMoran	Introduction, 1.7.2 (Fabric Filters)	*"Without a pre-coat**,** the filter material* ***may*** *allow~~s~~ fine particulates to bleed through the bag filter system..."*	Addressed
China	Introduction, 1.7.3	Suggest adding secondary pollution of fly ash and other solid wastes.	Addressed
Freeport McMoran	Introduction, 1.7.2 (Wet Scrubbers)	*"This can be avoided by presence of ions with which mercury can react to form a complex, such as fluoride, chloride, bromide or iodide.* ***The re-emission of mercury from the scrubbing solution is also very temperature dependent****"* Rephrase first sentence to say that Hg removal is dependent on acidity of scrubbing solution.	Addressed in consideration with the halogen issue.
Freeport McMoran	Introduction, 1.7.2 (Activated Carbon and Oxidizing agents)	*"The mercury capture can be enhanced by adding oxidizing agents (i.e. halogens) to the flue gas or by using impregnated activated carbon with halogens* ***or sulfur****."*	Reference to sulfur included.
Freeport McMoran	Introduction, 1.7.2 (Activated Carbon and Oxidizing agents)	*"Activated carbon waste should be* ***properly characterized prior to making a waste determination and recycles or disposed of properly. If the carbon waste is not characterized prior to disposal, then the waste should be*** *handled as hazardous waste."*	References to appropriate handling of wastes are included throughout the document.
United States	Introduction, Section 1.8	Rename section from Mercury Emissions Monitoring to 'Mercury Measurement' or 'Mercury Characterisation'. Note difference between measurement and monitoring	Noted The intention of the

			section is to describe mercury emissions monitoring – no change. Further changes have been made in the text to distinguish between measurement and monitoring.
United States	Introduction, Section 1.8, overview	Include measurement location, type and number of facilities and fuel types in 'representative' discussion. Also include a description of the concept of 'measurement fit for purpose' this would identify as a starting point what a source wants to accomplish with Hg monitoring to select most appropriate measurement of monitoring approaches. Document needs to be clear in difference between measurement and monitoring	Noted Measurement location has been included as a consideration for sampling. Type of facility and fuel types are covered under individual sector chapters. Number of facilities is not relevant to sampling within an individual facility. Concept of "measurement fit for purpose" is already reflected in the text. Note that this text is not intended as a procedural document on how to conduct mercury emissions measurement and monitoring. It is meant as an overview. Highly technical terms are not being used, keeping in mind the intended audience. Further changes have been made in the text to distinguish between

			measurement and monitoring.
United States	Introduction, section 1.8	Reference to ‘random grab samples’ should be replaced with ‘short term testing effects’	Not accepted. The intention of the sentence is meant to illustrate the importance of taking composite samples. It is unclear what is meant by short term testing effects.
NRDC	Introduction, section 1.8	Comment: There is general misuse of monitoring terms that will become extremely confusing for readers, especially in an international context. The use of CEMS and SCEMS should be checked and used correctly (detailed information in submission).	Not accepted. It is noted that the comments provided are based on terminology used by a specific jurisdiction only. Whereas, this text is meant as an overview for all parties to the treaty and should be kept general. Terminology particular to any one jurisdiction is not preferable.
United States	Introduction, section 1.8.2	Suggest rolling Direct Measurement Methods in with section 1.8. 2. 1 and renaming ‘Emission Characterization Test Methods’, followed by a description of why they are short term measurements, describe the methods. Replace ‘estimation’ in first paragraph with ‘measurement	Noted. “estimation” has been replaced with “measurement”. Direct measurement methods will be retained in a separate section and not renamed, as the intention is to discuss direct and indirect measurement methods separately.
Freeport McMoran	Introduction, 1.8.1	*“All relevant sources of mercury emissions should undertake mercury emissions monitoring*, ***where applicable***. *”*	Not accepted.

Freeport McMoran	Introduction, 1.8.1	*"In addition, site-specific characteristics ~~may~~ need to be taken into account when selecting the most appropriate monitoring method and planning for the sampling campaign. Depending on the process, mercury may be present ~~to a variable extent~~ as particulate-bound mercury, ..."*	Accepted.
Freeport McMoran	Introduction, 1.8.1	*"Samples should be taken at ~~steady state conditions~~ representative **conditions** of normal facility operations."*	Accepted.
Freeport McMoran	Introduction, 1.8.1	*"When conducting sampling, care must be taken, as far as possible, to ensure that the process is operating at ~~normal steady state~~ **representative conditions**..."*	Accepted.
NRDC	Introduction, section 1.8.1	Amended text as follows: "The selection of a measurement or monitoring approach should begin with consideration of the intended outcomes. Short term measurements may be needed to provide quick feedback for process optimization, and ~~or~~ long term monitoring may be desirable for **more accurate emissions data and** emissions inventory reporting. Continuous emissions monitoring may be needed to control the process if mercury emissions are highly variable, for example due to rapidly changing mercury contents in the feed materials, **or to improve compliance with applicable standards.**	Not accepted. Short term measurements can also be accurate. The text is intended to discuss the suitability of the measurement period with respect to the purpose of the measurement. Compliance with emission standards can be evaluated without the use of continuous emissions monitors.

United States	Introduction, section 1.8.2.1.1	Suggest renaming from impinger sampling to isokinetic sampling. In para 3, revise to read "A probe and sample nozzle are inserted.." the last sentence should be revised to read "It is paramount to avoid any loss of sample as it would bias the test result low". Finally, results provide increased understanding of actual source emissions over time with an increase in the number of data points. 3 measurements per year over many years gives a good picture of steady state operations.	The term "impinger sampling" is used to indicate the type of equipment applied in this method, similar to how the term "sorbent trap sampling" is used later in the chapter. The text does explain that impinger sampling is to be conducted isokinetically. Included suggested text "a probe and sample nozzle are inserted…". Accepted "it is paramount to …" but reworded for clarity. Accepted final point on increased frequency of measurements.
Canada	Introduction, 1.8.2.1.1	EPA SW-846 Method 0060 is used to determine the concentration of metals in stack emissions from hazardous waste incinerators and similar combustion processes. For clarity, please add reference to Method 0060.	The method is now included.
Canada	Introduction, 1.8.2.1.1	Under Method ASTM D6784- 02 (Reapproved 2008): Delete "(250°F)" – Use SI units	Non-SI units removed.
Freeport McMoran	Introduction, 1.8.2.1.1	*"Operating conditions should be documented ~~before, during and after~~ **throughout** the sampling campaign."*	Accepted.
Freeport McMoran	Introduction, 1.8.2.1.1	*"Similarly, in the non-ferrous metals sector, mercury in furnace feeds ~~can~~ **may** change rapidly depending on the concentrates being processed."*	Accepted.
Freeport McMoran	Introduction, 1.8.2.1.1	*"The addition of mercury testing when conducting these broader air pollutant sampling campaigns ~~may~~ will increase operating costs of a facility."*	Not accepted.
Freeport McMoran	Introduction, 1.8.2.1.1 (Method ASTM D6784- 02 (Reapproved 2008))	Suggest keeping Fahrenheit value.	Not accepted. Consensus to use SI units.
NRDC	Introduction, section 1.8.2.1.1	Remove reference to temperature in Fahrenheit	Accepted.
United States	Introduction, 1.8.2.1.2, US EPA	Emphasis should be on performance-based method that gives source measurements of known quality which the others do not.	Not accepted. The text is meant to introduce all

	Method 30B		relevant methods, without emphasizing certain methods.
United States	Introduction, 1.8.2.1.2, Sorbent Trap Sampling	Suggest adding to end of sentence in second paragraph "…. ; in general this is a location following a particulate control device. This mitigates the impact of any potential for bias from particulate bound mercury in the sample." Another advantage of sorbent trap analysis is that the results from thermal desorption analysis may be known while the tester is still in the field; this is useful for engineering tests with varying conditions or for mercury monitor Relative Accuracy Test Audits.	Accepted, with rewording for clarity.
United States	Introduction, 1.8.2.1.2, Sorbent Trap Sampling	Suggest moving to 1.8.3 as PS12 is a CEMS approach. Perfomance Specification 12 is a performance specification, not a method and should be referred to as such	Text has not been moved, but is now referred to as a "Performance Specification".
United States	Introduction, 1.8.3, Continuous measurements	Suggest renaming section "Côntinuous Emission Monitoring". Include introductory paragraph on what it is, why needed. Add section on using measurements for process control and characterization, including speciated measurements	Not accepted. The section on direct measurement methods has been intentionally organized by short, long and continuous measurement methods. Introductory text on continuous measurement and its applicability has already been included. This text is meant as an overview of various mercury emission measurement methods. Discussion of process control and characterization is beyond the scope of this document.
United States	Introduction, 1.8.3.1, Continuous Emission Monitoring Systems	Amend first section, 4th para as follows "The CEMS ~~should~~ **must** be calibrated to ensure data accuracy" Refer to Performance Specification 12A as a Performance Specification not a method.	Accepted.
Canada	Introduction, 1.8.4.1	*"In a system with multiple emission sources and limited data from outlet stacks or ducts, the mass balance approach may provide ~~more~~ useful and representative information… ."* The use of "more" does not indicate what it is relative to. Suggest deletion.	Accepted.

United States	Introduction, 1.8.4.1, Mass Balance	Suggest adding **"Full digestion of the sample is required to accurately determine a mass balance of mercury from a solid or liquid sample"** before the last sentence	Not accepted. This text is meant as an overview of various mercury emission measurement methods. The text suggested here pertains to laboratory analysis of liquid samples and goes beyond the scope of this document.
Coal			
Iran	General	The environment immediately surrounding coal-fired power plants has not been taken into consideration	Covered by general descriptions in the introduction
United States	General	Ensure all figures and tables are referenced (i.e. figures 11 and 12)	Addressed
ZMWG	Coal – general	Very informative, however incomplete, as many more BAT/BEP may be considered. ELVs achievable with the use of BAT/BEP should be included, and the scope should be clearly defined. Need to consider cross-media effects. The water and residue pathway should be better considered and an integrated pollution prevention approach used. Techniques are available to adequately control potential cross-media effects. Alternative BAT/BEP options which prevent coal combustion should be promoted (ie alternative energy, energy efficiency)	Commercially available Identified techniques were included in the document. Performance levels for these techniques have been included where information is available. Further techniques may be reviewed and included in future versions of the document. Group considered that the inclusion of alternatives was outside its mandate.
ZMWG	Coal – general	Guidance should be clear on performance levels which would be considered BAT and what technique or combination of techniques are considered as BAT to conclude what is achievable in the sector under economically and technically viable conditions. These performance levels should be set under clear reference conditions.	Indicative values reflecting achieved performance have been included with reference conditions.
ZMWG	Coal – general	The scope should be clearly defined.	Introductory text includes comments on scope.
ZMWG	Coal – general	Need to consider cross-media effects. The water and residue pathway should be better considered and an integrated pollution prevention approach used. Techniques are available to adequately control potential cross-media effects.	Mentioned as effects in the chapter. A further general statement relating

			to cross media effects and references for managing them is included in the introduction.
ZMWG	Coal – general	Alternative BAT/BEP options which prevent coal combustion should be promoted (ie alternative energy, energy efficiency)	The group considered that this was outside the mandate of guidance on Annex D sources. .
National Toxics Network	Coal-fired power plants and industrial boilers	The chapter does not include any consideration of alternative energy generation, but rather presents a manual of how to better operate coal fired power plants.	The mandate is to develop BAT/BEP for Annex D sources of mercury emissions.
Energy Supply Association of Australia (ESAA)	Coal – general	Guidance provides a wide ranging and comprehensive overview of BAT/BEP. Will be a useful point of reference. It needs to be recognized that the impact of implementing measures will vary with regional specific factors. The impact on electricity supply costs as well as security and reliability of supply needs to be considered. Changing fuel sources after construction is prohibitively expensive, so the imposition of emission restrictions is best considered at commissioning of new facilities. Imposition of controls in addition to those currently required would be very costly.	General comments on imposition of BAT/BEP. Does not require any amendment to the guidance.
Energy Supply Association of Australia (ESAA)	Coal – costs	Costs should take into the mercury content of the source coal, as costs are proportionally higher for low-mercury coal	Cost references are included for specific situations.
Canada	Section 1 (General)	Include mention of mercury releases from other fuel sources, such as biomass and natural gas in the documents. Also mention zinc amalgamation as a mercury removal technique.	Outside the scope of the document which deals with coal-fired sources only. No public information in the context of coal combustion available.
Canada, US	Section 1	Remove closing parenthesis: "…with increased potential mercury emissions) . However, the number…"	Addressed
United States	Section 1, paragraph 3 L1-2	Awkward sentence; "electricity" stated 3 times in the same sentence	Addressed
NRDC	Coal, section 1	Amend as follows: ~~While not~~ **Even when not** designed specifically for mercury capture,	Addressed
NRDC	Coal, section 2, Title	Delete 'The'	Addressed
United States	Section 2.1, para 1, first sentence	'deposit' generally used with respect to metallic deposits not coal. Revise with deletion of term 'deposit' to read "…even in the same coal. The quality of a coal is determined by its composition…"	Text amended to refer to coal seam, second reference to deposit deleted

Canada	Section 2.1	For coal type descriptions, state if the percentages refer to "fixed carbon"	Corrected to refer to fixed carbon
Canada	Section 2.1	For coal type description, make a distinction between net and gross calorific values.	All ranges are gross calorific values
Canada	Section 2.1	For the sub-bituminous coal calorific value range, increase to 15-30 kJ/kg	Ranges drawn from ASTM standards, original range maintained.
Energy Supply Association of Australia (ESAA)	Coal – section 2.1	Energy content figures appear to be incorrect. They are reported in units of kJ/kg, but the association feels these should be MJ/kg.	Addressed
United States	Section 2.1 paragraph 3	Insert space between "45" and "per cent"	Addressed
United States	Section 2.1, Figure 1	Unclear – what is signified by arrows above the terms brown coal and hard coal	Figure included as presented in the original reference
Canada	Section 2.1 (Table 1)	The list appears selective, with no mention of Canadian and Australian brown coal.	Table included as presented in the original references
Canada	Section 2.1 (Table 1)	Specify if values are for raw or dry coal.	Specified in the note to table 1
Canada	Section 2.1 (Table 1)	NCR: Consider reviewing Canadian mercury content range. Canadian sub-bituminous should be higher. New data can be obtained from ECD.	Table included as presented in the original references. Inclusion of further information, when available, would be feasible, however at this stage no additional information has been submitted.
United States	Section 2.1 Table 1	Number of decimal places is not consistent. Not all decimals included are significant	Table included as presented in the original references.
United States	Section 2.1 Table 1	"Mercury" should be lower case; "This data" should be "These data"	Addressed
NRDC	Coal, section 2.1	Insert 'while' between "brown coal" and "bituminous	Addressed
United States	Section 2.2, para 2 L 5-6	Revise sentence to read: **"Accordingly, pyrite (FeS_2) is the dominant mineral host for mercury in coal, and in rare cases with anomalous mercury enrichment, cinnabar (HgS) may also be present (Kolker et al., 2006; Kolker, 2012 and references therein)"** note that cinnabar is present only in very rare cases in coal with Hg content of 5.0 mg/kg or more.	Addressed

		Also, add the following references: Kolker, Allan, Senior, C. M., and Quick, J. C., 2006, Mercury in coal and the impact of coal quality on mercury emissions from combustion systems: Applied Geochemistry, v. 21, p. 1821-1836 Kolker, Allan, 2012, Minor element distribution in iron-disulfides in coal: A geochemical review: International Journal of Coal Geology, v. 94, p. 32-43.	
China	Section 2.2	Suggest adding **Supercritical and Ultra Supercritical** techniques to the "*Different combustion or firing methods of coal are used in power plants and industrial boilers*" list.	Comments relating to supercritical and ultra supercritical techniques have been included in the efficiency section.
Canada	Section 2.2	NCR: Consider adding additional reference to Senior et al 2004 literature survey. SaskPower reported lower oxidation rates (20% rather than 45-80%). SaskPower: On same reference, some western Canadian coal has a 10% rate, due to low Cl content.	Without published reference, the lower oxidation rates could not be included.
Canada	Section 2.2	Clarify language: *Onsite measurement of mercury concentrations from a circulating fluidized bed boiler shows that particulate mercury is of majority in flue gas of the boiler* (Duan et al., 2010).	Addressed
United States	Section 2.2, paragraph 5 L1-2	- "finely grounded coal" should be "finely ground coal"	Addressed
United States	Section 2.2, paragraph 6 L5	- "particulate matters" should be "particulate matter"	Addressed
NRDC	Coal, section 2.2	Insert "The form of the mercury in the flue gas is important because the form determines whether or not it can be captured and, if so, how." Immediately after Figure 2.	Reference to mercury speciation comes in a separate section (Section 3). It is not relevant in section 2.2.
NRDC	Coal, section 2.2	Insert "Elemental gaseous mercury is a gaseous form of mercury that cannot be captured unless first transformed into oxidized or particulate mercury. Particulate mercury and oxidized mercury can be removed with pollution control devices." Immediately before 'The relative amounts of mercury…'	Not relevant in this section which is describing the types of mercury emissions. This is covered adequately in the sections relating to pollution control devices. .
NRDC	Coal, section 2.2	Change the references to chlorine to refer to 'halogens". In referring to concentrations in coal, change to read "**concentration of halogens (such as chlorine or bromine)** ~~chlorine~~ present in the coal,…"	As the main halogen naturally present in coal is chlorine, the sentence is considered accurate and is not changed.

NRDC	Coal, section 2.2	Add "cylone firing of crushed coal" to the list of combustion or firing methods of coal, and references in the following paragraph. Add the following text at the end of the paragraph: **"In cyclone firing crushed (but not pulverized) coal is burned in a swirling combustion chamber at high temperatures, making a liquid slag out of most of the mineral matter in the coal. The hot gases then enter the furnace where they radiate heat to the furnace walls and convect heat to generated steam, which drives a turbine generator set to produce electricity. Cyclone boilers generate less fly ash per unit coal burned than PC boilers because most of the mineral matter in a cyclone boiler becomes a liquid slag that is collected from the bottom of the cyclonic combustion chamber. Cyclone boilers, however, tend to be high NOx emitters due to the high combustion temperature."**	Included, with deletion of reference to NOx generation.
Canada	Section 3.1	On coal washing, mention that while it reduces Hg emissions but that the Hg is instead released into the water.	Addressed in cross media, with additional specific comment added.
Canada	Section 3.1	"It should be noted, however, that most lignite and ~~brown~~ **sub-bituminous** coals are not amenable…"	Addressed
Canada	Coal, 3.1	First two sentences deal with the same issue. Consider combining and rephrasing.	Addressed
United States	Section 3.1 para 2, L3	Revise to read: "Raw coal contains mineral impurities such as clays, and may also contain fragments or partings of co-occurring rock. Together, this inorganic portion of coal is referred to as ash" it is improper to say that "rock" is a mineral impurity	Text changed in line with other comments.
United States	Section 3.1. para 2. L6	Expand description of coal washing procedures, as this is very generalized compared to detail of mercury control technologies. Include specific approaches such as froth flotation	Noted, however detailed information on mercury reduction levels as a function of coal washing techniques are is limited.
United States	Section 3.1, cross media effects	- Add period after "not safely managed"	Addressed
NRDC	Coal, section 3.1	Cross media effects of coal washing – expand challenges of potential contamination, include some methods to safely manage the waste.	Inclusion of a general comment in introduction relating to management of cross media effects.
United States	Section 3.2, paragraph 1 L1-2	- Revise "~~The~~ **An** overview of the magnitude of co-benefit mercury removal for different configurations of existing APCSs **is** ~~are~~ shown in Table 2"	Addressed
ZMWG	Coal –section 3.2, above figure 4, also at end of description of common techniques with mercury	*Addition:* **"Measured and verified stack mercury emission concentrations of EU and US coal fired combustion plants with different size, load, age and fuel types confirm that emission levels below 1µg/Nm³ are achieved by co-benefits only from common pollution controls such as SCR+ESP + wFGD or SCR+FF+FGD. For lignite fired plants, levels below 3µg/Nm³ are achieved.**	Currently, reference to the working group of the EU BREF is not appropriate as the report is not yet published. This may be included in a later revision

	benefit	**The Technical Working Group of the revised EU Best Available Techniques Reference Document (BREF) for Large Combustion Plants concluded that <1µg/Nm³ is achieved with specific mercury abatement techniques under technically and economically viable conditions for operators of both lignite and hardcoal fired new and existing sources (>50MW thermal).“** *Rationale: the document should provide clear guidance on what emission levels can be achieved already under technically and commercially viable conditions. The example of Japan is therefore very useful, which confirms also the levels achieved in the EU since more than a decade. The Final EU LCP BREF Technical Working Group meeting in June confirmed that <1µg/Nm³ (annual average, Oxygen level normalised to 6%) of hg emissions to air is achieved through dedicated mercury control techniques for all coal types judged as achieved under economically and technically viable conditions.*	of the BAT/BEP guidance. (information available publically can be included if appropriate)
Canada (SaskPower)	Coal, 3.2 (Table 2)	On "FF only", good capture of oxidised Hg is not seen in lignite coals. Some Hg oxidation is seen but no capture.	Consistent with original reference. No change made.
Canada	Coal, 3.2 (Table 2)	To: *ESPc + wet FGD,* *ESPh + wet FGD,* *FF + Wet FGD,* *SCR + ESPc + wet FGD,* *SCR + HEX + LLT-ESP + wet FGD,* *SCR + ESPh + wet FGD,* *SCR + FF + wet FGD,* add "**unless the appropriate scrubber additives are used.**" after "*...may decrease the amount of co-benefit*"	This wording is consistent with original reference. No change made to the table. It is noted that the issue is further addressed in section 3.3.3
Canada (SaskPower)	Coal, 3.2 (Table 2)	On "SDA + FF", this is consistent with observations for low rank coals.	Noted.
Canada (SaskPower)	Coal, 3.2 (Table 2)	On: *SCR + ESPc + wet FGD,* *SCR + HEX + LLT-ESP + wet FGD,* *SCR + SDA + FF,* *SCR + ESPh + wet FGD,* *SCR + FF + wet FGD* - Mercury oxidation across an SCR does not always occur, especially for low rank coals which have low chlorine contents.	Consistent with original reference. No change made
Canada (SaskPower)	Coal, 3.2 (Table 2)	On "SCR + ESPc + wet FGD" – Ammonia used in SCP for NOx control is a reducing agent and may increase elemental Hg.	Consistent with original reference. No change made

United States	Section 3.2, paragraph 2 L2 -	"Is quite effective" should be "are quite effective"	Addressed
Canada (SaskPower)	Coal, 3.2	Therefore, co-benefit techniques, which can control air pollutants emission and moreover remove mercury, ~~is~~ **may be** quite effective as a comprehensive air pollution control. (This does not work in all cases)	Addressed
Canada (SaskPower)	Coal, 3.2	On "*The combination of SCR, ESP and FGD is quite typical at advanced coal-fired power plants...*" This is not always the case as SCR is not compatible with all coal types.	No change needed, as document does not state that this is always the case.
Canada (SaskPower)	Coal, 3.2	On "*which results in **1.2 µg/m3** of mercury concentration in the flue gas*" This is dependent on initial Hg content of the coal. Consider revising.	This was a specific data from Japan referenced in the text.
United States	Section 3.2	Amend last sentence of para on page 11 to read , "Therefore, co-benefit techniques, which can control air pollutants emission and moreover remove mercury, can be quite effective as a comprehensive air pollution control."	Addressed
Canada (SaskPower)	Coal, 3.2 (Figure 3)	Dry FGD shown as moving bed of coke, but this kind of dry FGD is largely limited to Japan. Conventional FGDs do not have the same effect. Consider revising/adding additional information.	Information supplied was relevant to Japan, and the text describes the existing situation.
United States	Section 3.2, Fig. 3 caption	- Should read "...configuration of a coal-fired power plant..."	Addressed
China	Coal, 3.2	In last para, suggest presenting Hg removal efficiencies as range values rather than averages,	Addressed
United States	Section 3.2, paragraph 3 L1	- Unclear. Subject carried over from a previous paragraph.	Addressed
United States	Section 3.2, paragraph 3	- "averagely" should be "averaging"	Addressed
NRDC	Coal, section 3.2	Amend 'Depending on' to read 'Depending **up**on"	Addressed
NRDC	Coal, section 3.2	End of first paragraph – consider adding relevant portion of Table 1 of 2015 ES/&T article by Zhang et al following Table 2.	Addressed
NRDC	Coal, section 3.2 Table 2, Row 3	Add "Catalytic oxidation on filter cake enhances oxidation and capture." After Good capture of oxidized mercury	Original text is consistent with original reference. No change made
NRDC	Coal, section 3.2 paragraph following table 2	Amend last sentence to change 'is' to 'can be	Addressed
NRDC	Coal, section 3.2 paragraph following figure 3	"...as well as high level mercury removal efficiency**, which in this** ~~case as averagely~~ **averages** 74.4 per cent, which results in 1.2 µg/m3 of mercury concentration in the flue gas **for this application."**	Addressed

NRDC	Coal, section 3.2 paragraph following figure 3	the combination of SCR, Low Low Temperature ESP (LLT-ESP), and wet FGD, can achieve quite high level mercury removal efficiency ~~as averagely~~ **averaging** 86.5 per cent **in this case**, which results in 0.88 µg/m3 of mercury concentration in the flue gas for this specific case."	Averaging corrected, and text amended to make clear that it is 'in this case'.
NRDC	Coal, section 3.2 paragraph following figure 3	Delete reference to 'and/or smaller' – it is not clear what age or size has to do with mercury emission rates.	Factual statement that in this case the higher levels were seen in smaller or older facilities. Sentence split into two statements.
NRDC	Coal, section 3.2 figures 4 and 5 and associated discussions	Explain difference between ESP and LLT-ESP. Is SCR+ESP+FGD, cold-side ESP? This is explained later, but should be explained here. Also introduce the importance of temperature to drive mercury to oxidized form. Dry FGD is followed by (rather than preceded by) an ESP or FF – very different to a wet FGD. Age or size of the unit may be less important than coal halogen levels, carbon levels in fly ash, gas temperatures, pH of wet scrubber.	Information on temperature included for definition of LLT ESP. Examples provided here as an indication, however the mechanisms are explained in the next section.
Canada (SaskPower)	Coal, 3.2.1.1	On "*Low temperatures in the control device system (less than 150 °C) also enhance mercury control…*" Note that low flue gas T gives better Hg retention, however lower limits exist for ESPs to avoid corrosion. 150C is typical.	Statement reflects Japanese practice and is correct for its situation
United States	Section 3.2.1.1 paragraph 3 L1-2	- Revise "~~has~~ **have** been observed for ESPs" and also "whether it is a**n** ESPc or ESPh installation"	Addressed
United States	Section 3.2.1.1 paragraph 4 L1	- Revise to read "modeling of mercury removal in ESPs indicates…"	Addressed
United States	Section 3.2.1.1 paragraph 4 L11-12	- Revise to read "likely a function of halogens presents"	Addressed
United States	Section 3.2.1.1 paragraph 5 L3	- "The study" should be "This study"	Addressed
United States	Section 3.2.1.1 paragraph 6 L4	- Should read "with higher halogen contents"	Addressed
NRDC	Coal, section 3.2.1.1	Add "and the treatment time, which is determined by the size of the ESP (and is related to the specific collection area, or SCA, a measure of the collection area versus the gas volume being treated)" at the end of the second sentence	Covered in introductory section.
NRDC	Coal, section 3.2.1.1	Add "An ESPh is generally much less effective than an ESPc at removing mercury because mercury tends to oxidize as temperature drops, making it more susceptible to adsorption onto fly ash and capture with the lower temperature ESPc."after the 3rd sentence in the 2nd paragraph	Addressed partially, in para 4 not para 3.
NRDC	Coal, section 3.2.1.1	Reference to removal efficiency for an ESP operation should clarify whether it is hot or cold side ESP.	Clarified as cold side

NRDC	Coal, section 3.2.1.1	Add "Sulfur content of the coal as well as level of unburned carbon in the fly ash will also impact the degree of mercury capture by the ESPc" at the end of paragraph 3.	Addressed
NRDC	Coal, section 3.2.1.1, second sentence paragraph 4	Delete 'generally'.	Addressed
NRDC	Coal, section 3.2.1.1, paragraph 6	Add "SO3 from coal sulfur or from flue gas conditioning will also suppress the mercury capture in an ESPc because the SO3 competes with mercury for capture on the carbon" before the last sentence	Included with some editing.
Canada (SaskPower)	Coal, 3.2.1.2	On "*...between 4 and 20 per cent capture in ESPs and between 20 and 80 per cent capture in FFs.*" This is application dependent, as little Hg removal is seen in our FFs and ESP due to little Cl and UBC.	Updated figures with new data. 1
United States	Section 3.2.1.2 paragraph 3 L1	- Should read "which has **a** comparative application rate"	Editorial - ok
NRDC	Coal, section 3.2.1.2	Add "The result is that gaseous elemental mercury is more likely to be oxidized and transformed into a form that can be captured when a FF is used" after second sentence para 2	Addressed
Canada (SaskPower)	Coal, 3.2.1.4	On "*Flue gas cooling results in the reduction of temperature from 135 to 90 °C of the flue gas exiting the air heater*". SP uses flue gas cooling to 85C in recent installation. No Hg co-benefits have been observed, but not enough observations exist to determine this.	Addressed
United States	Section 3.2.1.4 paragraph 2 L1-2	- Should read "results in ~~the reduction of~~ temperature **reduction** from 135 to 90 °C"	Addressed
United States	Section 3.2.2.1 paragraph 2 L3	- Should read "……….optimization of ~~the~~ co-benefit strategy…."	Addressed
United States	Section 3.2.2.1 paragraph 2 L4	- Should read "…….to prevent re-emission of mercury. **M**~~m~~ercury re-emission may take place…."	Addressed
NRDC	Coal, section 3.2.2.1	Delete 4th sentence para 1 commencing "The operation of a wet FGD…" as it is not correct and does not add to the discussion	The statement is considered by the Group to be factually correct, and no change was made.
Canada (SaskPower)	Coal, 3.2.2.2	Consider including information on Circulating Dry Scrubbing (CDS), which achieves higher SO2 removal than SDA-FF and is cheaper than FGD. Could be suitable for small installations.	Additional information included.
ZMWG	Coal –Section 3.2.2.2	*This issue of mercury sinks / release to water needs to be further developed in this section.* *WetFGD are the common SO2 abatement in the EU and there are techniques to ensure Hg capture in the wastewater of the FGD unit e.g. Membrane filtration. Additional*	Cross media text already suggests that wastewater and dry material must be treated. There is not an

		evidence can be provided by the EEB showing that emission levels of mercury < 0.05µg/l (yearly average) prior to wastewater release are achieved. The Technical Working Group of the LCP BREF review agreed to set the range of concentration of hg emissions after the FGD waste water treatment plant at 0.2-3µg/l (daily averaged). For FGD gypsum used for wallboard the mercury can be removed with dedicated techniques (e.g. activated carbon and hydro-cyclones). This should be further elaborated in this section. Hg in FGD wastewater can be captured and hg in gypsum is also addressed through specific techniques. *As it stands the para suggests these cross-media effects cannot be overcome, which is misleading.*	implication that these effects cannot be overcome. No amendment required.
ZMWG	Coal –Section 3.2.2.2	Guidance needs further emission levels achievable with the use of these techniques.	Addressed
NRDC	Coal, section 3.2.2.2	Delete 2nd sentence commencing "Some issues that limit…" as it is incorrect. The limiting factor is the not the PM control device.	Addressed
NRDC	Coal, section 3.2.2.2, paragraph 1, last 2 sentences	This statement is incorrect. Concentration of lime in the slurry limits SO2 removal, not the FF.	Text referenced is not related to SO2 removal. No changes made.
NRDC	Coal, section 3.2.2.2, cross media effects (non-mercury related)	Delete, as it is energy impact not cross media.	Changed heading to refer to "other effects"
Canada (SaskPower)	Coal, 3.2.3	Include discussion on low NOx combustion. This is associated with higher UBC amounts, which can result in greater Hg capture. However, this may also result in efficiency reductions.	The section deals with post-combustion NOx rather than consideration of low NOx combustion . Title amended for clarity
Canada (SaskPower)	Coal, 3.2.3	On "*Thus, the maximum co-benefit of the existing SCR may be achieved by an appropriate coal-blending or by bromide addition*" Include information on risks of Br addition. Corrosion may occur, for instance in air heaters.	Addressed
United States	Section 3.2.3 paragraph 2 L6	- Should read "….achieved by ~~an~~ appropriate coal blending…."	Addressed
United States	Section 3.2.3 paragraph 6 L3	- "environmentally sound disposed" should be "disposed in an environmentally sound manner"	Addressed
NRDC	Coal, section 3.2.3, paragraph 1, sentence 3	Change "high ~~chlorine~~ **halogen** coal"	Chlorine is actually the halogen present. Not appropriate to change.
NRDC	Coal, section 3.2.3, end paragraph 1	Add "Also, oxidized mercury is more likely to be adsorbed onto fly ash, which will improve capture by the ESPc" at the end of paragraph 1	Included in an amended form

NRDC	Coal, section 3.2.3 paragraph 2, sentence 1	Change "~~chlorine~~ **halogen** content of coal"	Chlorine is the primary halogen present in coal. No amendment needed.
NRDC	Coal, section 3.2.3, paragraph 2, sentence 2	Clarify that the statements relating to oxidation of elemental mercury to oxidized mercury is relevant to the United States and may not be the case in other countries	Addressed
NRDC	Coal, section 3.2.3 paragraphs 3 and 4	These may relate more to halogen content that to coal rank. If a boiler had subbituminous coal with adequate halogen, there would be no need to blend with another coal or to add bromine.	Amended to reflect high chlorine.
ZMWG	3.2.4 -	Proposal for a new table to be included.	Included with other data early in the section
Canada (SaskPower)	Coal, 3.3.1	Include text stating that coal blending is only useful for plants using coal from multiple sources. Many plants are designed for one type of coal from a single source. Using alternative fuels in these may result in sub-optimal operation.	Included
CREPD	Coal section 3.3.1	This statement "Blending bituminous coal with subbituminous coal provides the double benefit of higher chlorine concentration and lower alkalinity. In the context of mercury control, the objective of coal blending would be to increase halogen concentration by mixing relatively high halogen content coal with low halogen coal that might be used at the plant" may infer that there will be an increase potential for the formation and release of unintentional POPs (dioxins and furans). It may be useful to see in the document how this category of pollutants is simultaneously controlled.	Generation of dioxin and furan from coal-fired power plants is not identified as an issue.
United States	Section 3.3.1 paragraph 3 L5	- Revise to read "…and hence **a** higher **percentage of** elemental mercury ~~percentage~~"	Addressed
NRDC	Coal, section 3.3.1, paragraph 2, sentences 2 – 4	This is a US centric point that may not apply elsewhere. Put the statement in the context of high halogen vs low halogen rather than high sulphur vs low sulphur or bituminous vs subbituminous. The text should also mention that increased oxidation will also improve removal by the PM control device.	References are clearly from the US. Other comments addressed elsewhere.
NRDC	Coal, section 3.3.1, table 3	Mercury content varies across coals and even for the same coal. Give ranges applicable globally. Not clear whether these values are typical of coals outside the US.	Clear from sources that this is US data, and it is indicated that this may vary depending on source of the coal.
NRDC	Coal, section 3.3.1, table 3	Note that mercury content also varies widely.	Addressed
Canada (SaskPower)	Coal, 3.3.2	Same comment as for 3.3.1. Also mention environmental concerns of halogen addition.	Halogen addition recognized elsewhere in guidance and issues addressed.
United States	Section 3.3.2	Text might reference that another halogen being investigated is iodine, which may have less corrosive potential than bromine, but may have other uncertainties. Could add 2 additional references:	These may be emerging techniques, but were considered too preliminary

		"The development of iodine based impinger solutions for the efficient capture of Hg0 using direct injection nebulization-inductively coupled plasma ..." - PubMed - NCBI http://www.ncbi.nlm.nih.gov/pubmed/11783657 D. Wu, J. Du, H. Deng, W. Wang, H. Xiao, P. Li, "Estimation of atmospheric iodine on from coal combustion", International Journal of Environmental Science and ology, March 2014, Volume 11, Issue 2, pp 357-366, link.springer.com/article/10.1007%2Fs13762-013-0193-4	for inclusion. Additionally, the first reference is for monitoring rather than control techniques. The second reference considers iodine emission rather than mercury.
United States	Section 3.3.2	Cross media effects of mercury oxidation additives - Recommend that the paragraph acknowledge that the full range of scientific uncertainties associates with pollutant releases from bromine addition is still the subject of investigation – document has a degree of uncertainty.	Addressed
United States	Section 3.3.2 paragraph 4 L3	- Should read "…activated carbon results in **an** increase in bromine…"	Addressed
United States	Section 3.3.3, Fig. 10	- Lettering too small to view	Addressed
United States	Section 3.3.4, paragraph 2 L2	- Should be "Selective Mercury Oxidation Catalyst" or "selective mercury oxidation catalyst"	Addressed
United States	Section 3.3.4, paragraph 3 L3	- Should read "..by **a** high mercury oxidation SCR catalyst"	Addressed
United States	Section 3.4, L1	- Should read "Sorbents **with or** without chemical treatment ~~or chemically treated~~ …"	Addressed
Canada (SaskPower)	Coal, 3.4	On "…*emission limit values (ELVs) in the range of 0.0025 to 0.0075 pounds per Gigawatt-hr (representing 85 to 95 per cent control) have been met with routine use of ACI...*" Suggest highlighting that the Hg removal is highly application dependent. US MATS rule has adopted different ELVs for low and high rank coals for this reason.	Specific coal types inserted.
United States	Section 3.4, paragraph 4 L6-7	- Revise to read "Furthermore, **ACI** ~~it~~ has been demonstrated at a Russian power plant…" and "in a number of ~~individual~~ U.S. States (for example, Massachusetts,…."	Addressed
United States	Section 3.4.1, paragraph 2-	Pleasant Prairie Test and Gaston Test are not mentioned elsewhere in the text. Need to cite Fig.11 each time these are mentioned.	As the only references are in this paragraph which is discussing figure 11 it is clear that this is the figure being referenced
NRDC	Coal, section 3.4.1, paragraph 2, second last sentence	Insert "and air preheater" between FF and Compact Hybrid Particulate Collector	Not included - text is sufficiently clear as is.
NRDC	Coal, section 3.4.1, paragraph 3, first sentence	Is subbituminous coal low in halogens everywhere? Be clear that this is the US experience and coals from other parts of the world may have different chemistries.	Addressed

United States	Section 3.4.2, paragraph 1, L1	- Unclear what is meant by "this set of limiting conditions" Subject is carried over from a previous paragraph.	Addressed
NRDC	Coal, section 3.4.2, paragraph 2, point 2	Not clear if the lower injection rates of bromine apply if halogen levels are already high	Text is accurate and no change made
NRDC	Coal, section 3.4.2, paragraph 2, point 3	Amend "~~subbituminous and lignite~~ **low halogen**"	Accepted, but with reference to low chlorine rather than low halogen.
United States	Section 3.4.3, paragraph 1 L1-3	- Revise to read "Despite ~~the~~ ACI being commercially implemented in multiple and diverse applications, there are some remaining potential issues that include fly ash marketability for concrete manufacturing and the effect of SO_3 on ~~the performance of~~ ACI **performance**"	Addressed
Canada (NCR)	Coal, 3.4.3	*"Alkaline materials that have been considered and tested for this application include magnesium oxide (MgO), calcium hydroxide (Ca(OH)2), sodium bicarbonate (NaHCO3), and sodium sesquicarbonate (trona) (Feeley and Jones, 2009)."* As this is now more widely used, this information seems outdated. Suggest expanding section which highlights the negative effect on Hg reduction efficiency of ACI and discussion on how that can be addressed.	No change to the text as at this stage there are no references which clearly indicate negative effects on mercury control at the level used for SO3 control.
United States	Section 3.4.3	Suggest adding additional references that support statements in the cross media section	Included where feasible
United States	Section 3.4.3, paragraph 3 L1	- "Another effective way" should be "An effective way"	Addressed
United States	Section 3.4.3, paragraph 5 L1	- Replace "Other non-carbon sorbents were also tested that were designed to preserve fly ash quality…" with "Other non-carbon sorbents are designed to preserve fly ash quality"	Addressed
NRDC	Coal, section 3.4.3, cross media effects	Quantify the amount of increase in quantities going to landfill. Quantities of carbon is very small compared with fly ash.	Addressed
NRDC	Coal, section 3.4.3, cross media effects, last sentence	Is the secondary mercury release from thermal treatment of fly ash and electrostatic separation of carbon from fly ash in the ESP or in an after treatment? Clarify.	Addressed
ZMWG	Coal –Section 3.4.5	List of techniques is incomplete. Also include information on chemically enhanced membranes (Gore modules). These are installed in some US plants and should be considered as established technique. Emission levels achieved are below 0.2µg/Nm³ to ensure compliance with the New York hg state limit. Additional material provided	Paragraph included in emerging techniques as Fixed Bed Membrane Modules.
Canada (SaskPower)	Coal, 3.5	*"For ACI, the variable O&M cost is estimated to be small even though it is a major component of the total cost"* This depends on the application. Sorbent requirements can vary dramatically between different sites, and is the major cost of Hg control systems.	Additional comment included in text.
ZMWG	Coal –Section 3.5	Amend to 'costs **and benefits**' include data on benefits of avoided mercury emissions, both public benefits and benefits for the operators. Additional data provided in submission.	General issue of 'benefits'. addressed in introduction?

NRDC	Coal, section 3.5	Amend section heading to read "Costs **and Benefits** of mercury Control Technologies" Note that there is no discussion in this text of the benefits of stricter mercury controls on coal combustion facilities. Submission provides some references	General issue of 'benefits'. addressed in introduction
NRDC	Coal, section 3.5	Include PM in the list of other pollutants along with SO2 or NOx	Addressed
NRDC	Coal, section 3.5 paragraph 1, last sentence	Amend: Usually mercury reduction through co-benefit effects (the installation of technologies such as FGD and SCR which also reduce mercury emissions) can be regarded as minimal or even 'free' **because high capital cost technologies like SCR and FGD are generally added for the purpose of NOx or SO2 control, respectively, and would not be added solely for mercury control because lower cost alternatives are available for mercury control.** Alternatively, mercury control may be accomplished by dedicated technology such as ACI **at a much lower cost providing that there is an existing PM control device.**"	Addressed
China	Coal, 3.5.1 (Table 4)	Suggest further research on value units.	Value units as cited in original reference. Year reference is included in title.
United States	Section 3.5.1, 3rd bullet	- Should read "varies with the capacity ~~factor~~ of the plant"	Sentence drawn directly from the reference. No change made.
United States	Section 3.5.1,paragraph 2 L3	- Should read "should be referred **to**…"	Addressed
United States	Section 3.5.1, paragraph 2 L4	- Should read "…and distributed the total annual cost…"	Addressed
NRDC	Coal, section 3.5.1	The sentence "Therefore, the BAT chosen for mercury capture can be different in different countries" implies that BAT selection is a function only of costs. Benefits side must be considered as well	Addressed
NRDC	Coal, table 4	Confirm year for currency.	Addressed
NRDC	Coal, table 6	Confirm year for currency.	Addressed
NRDC	Coal, table 9	Confirm year and currency.	Addressed
Canada (SaskPower)	Coal, 3.5.2 (Table 7)	Suggest inclusion of explanation for the cost criteria (very low, low, moderate…)	Costs are intended to be relative. Application of numerical values are not feasible due to different costs in different countries.
Canada (SaskPower)	Coal, 3.5.2 (Table 8)	Table values appear low. Consider checking.	Costs in $/kw are confirmed as correct.

United States	Section 3.5.2, paragraph 6 L3	- "cab" should be "can"	Addressed
ZMWG	Coal – Section 4	Delete "providing oxidants or catalysts for elemental mercury oxidation to enhance mercury capture in downstream wet FGD" *Rationale: These are well developed and implemented techniques in industrial scale and should not be mentioned here in order to avoid confusion.* *Section 4.2 (Non-thermal plasma) and Section 4.3 (Treated activated coke) needs to rewritten in order to provide clarity on what these techniques refer to and sources for performance levels achieved should be indicated.*	Deleted Description of techniques is sufficient for emerging technologies. Performances levels are included.
United States	Section 4, paragraph 1 L2	- Should read "at the bench- or pilot-scale stage…"	Addressed
United States	Section 4 and 4.1	- "sorbent" should be "sorbents"	Addressed
United States	Section 4.2 L3 -	Unclear- electrical discharge of what?	Addressed
United States	Section 4.2, L8	- Should read "…system reached ~~to~~ 40, 98, and 55 per cent, respectively.. "	Addressed
ZMWG	Coal – Section 5	Addition: (introductory paragraph for the implementation of the guidance) **"This guidance is intended to support Parties in selecting and implementing BAT for new and existing sources and in setting emission limit values accordingly that are consistent with BAT/BEP. The techniques described are generally applicable to the sector as a whole, as are the emission levels associated with BAT This guidance shall be used when selecting and implementing BAT for individual sources or [for coal-fired source categories under Annex D], it may be complemented by other updated information, where appropriate.** Rationale: An introductory paragraph on how to use this guidance could be added to foster harmonised implementation and level playing field for regulated industry.	Not considered necessary. .

NRDC	Coal, section 5, chapeau	Add: The use of BAT to control, and where feasible to reduce emissions, is required for new sources as defined in para 2(c) of Article 8 and is one of several measures which a Party may use for existing sources as defined in para 2(e) of Article 8. This guidance is intended to support Parties in selecting and implementing BAT. The final determination by the Parties of what constitutes BAT for atmospheric emissions of mercury from coal-fired power plants and industrial boilers needs to consider various technologies and techniques described in this guidance document. The Parties under Article 8 may use emission limit values (ELVs) for both new and existing sources that are consistent with the application of BATs. To be certain that the application of the BAT selected by the parties results in expected reductions in emissions of mercury, Article 8 notes that ELVs can be either in the form of limits on mercury concentrations or a limit on mass of mercury or a limit on emission rate of mercury or mercury compounds, expressed as "total mercury" emitted from the affected source. Well-defined ELVs (with necessary monitoring and reporting of mercury emissions already described in this report) associated with the selected BAT, will facilitate assurance that the application of BAT will result in the expected mercury reductions.	Information on selecting BAT is included in the introduction and is not repeated in each chapter.
ZMWG	Coal – Section 5.1.3	*Modify:* "The combination of SCR, ESP and wet FGD) **covering all ages, sizes, operating hours and variation in abatement techniques** can achieve mercury removal efficiencies up to 74 per cent and below 0.0012 mg Hg/Nm^3 **(1.2µg/Nm^3, normalized to 6 % O_2-content)** of mercury concentration in the flue gas . Moreover usually the cost of controlling mercury as a "co-benefit" is small because it is mainly for other pollutants such as PM, SO_2 or NO_X *Rationale: the variation of age, size classes, operating hours and abatement techniques type is considered in this range based on the EU reference plants data. The Technical Experts Group of the LCP BREF review confirmed in the Final LCP BREF that levels <1µg/Nm^3 can be achieved with the use of Best Available Techniques under technically and economically viable conditions.*	Reference to all ages, sizes operating hours and variation is not included as it is not clear from original references. Text redrafted to reflect additional information.
Canada (SaskPower)	Coal, 5.1.4	*"The operations of ACI technology in the United States show that mercury concentration in flue gas after ACI and fabric filters are lower than 0.001 mg Hg/ Nm3".* Suggest softening this statement, as this only happens in some cases.	Addressed
ZMWG	Coal – Section 5.1.4	*Modify:* "The operations of ACI technology in the United States show that mercury concentration in flue gas after ACI and fabric filters are lower than 0.001 mg Hg/Nm^3 **(1µg/Nm^3 normalized to 6 % O_2-content).** *Rationale: provide certainty for reference conditions used. The Technical Experts Group of the LCP BREF review confirmed in the Final LCP BREF that levels <1µg/Nm^3 can be achieved with the use of Best Available Techniques under technically and economically viable conditions.*	Levels in microgram included. .

ZMWG	Coal – Section 5.1.4	*Addition: after this section / or within each paragraph* **"Emission levels of mercury to water <0.05 µg/l (yearly) and 0.2-3µg/l (daily averaged) after the wastewater treatment plant from flue gas cleaning is achieved, such as by membrane filtration. The values are based on 24-hour flow-proportional composite samples. Mercury emission to water should be prevented e.g. through Zero Liquid Discharge Techniques due to environmental quality standards and compliance with the OSPAR Convention."** *Rationale: this issue of mercury sinks / release to water needs to be further developed in this section.* *WetFGD are the common SO2 abatement in the EU and there are techniques to ensure Hg capture in the wastewater of the FGD unit e.g. Membrane filtration. Simple transfers of mercury release from t air to water should not be allowed. The levels are based on evidence provided by the EEB showing that emission levels of mercury < 0.05µg/l (yearly average) prior to wastewater release are achieved. The Technical Working Group of the LCP BREF review agreed to set the range of concentration of hg emissions after the FGD waste water treatment plant at 0.2-3µg/l (daily averaged). Significant emission reductions are necessary for the compliance to the OSPAR Convention.*	Establishing release levels is considered outside the mandate of the group. Information on cross media effects is provided in the description of each technique.
NRDC	Coal, section 5.1.5 (new section)	Insert the following as a new section: "Section 5.1.5 Summary of Emissions Levels Associated with BAT/BEP As noted in section 5.1.3, control measures for mercury removal involves the use of conventional post combustion APCSs for SO2, NOX, and PM can result in substantial reductions in mercury emissions as a "co-benefit". The combination of SCR, ESP and wet FGD, which is an efficient technique already in common use in some countries, can achieve levels of 0.0012 mg Hg/Nm3 of mercury concentration in the flue gas. Further, dedicated mercury control, including ACI technology, has shown even more effective removal. The operations of ACI technology in the United States show that mercury concentration in flue gas after ACI and fabric filters are lower than 0.001 mg Hg/Nm3. Thus, as indicated above, the performance level associated with best available techniques and best environmental practices in installations with dedicated technology for control of mercury emissions to air (such as ACI) is below 0.001 mg Hg/Nm3 and is 0.0012 mg Hg/Nm3 for plants with conventional post-combustion APCSs. It is reasonable for Parties to require more stringent BAT, such as the level of control (or ELVs) associated with ACI technology, at new facilities. New facilities have the benefit of being able to design the most up to date technology into the plant, while existing sources must work within the limitations of the existing equipment, such as conventional pollution controls. For an existing plant, for example, there may not be adequate space available to retrofit BAT without relocating existing equipment at a very large expenditure. Regulations in the United States provide an example of more stringent requirements for new facilities versus existing facilities. As shown in the table, for the Mercury and Air Toxic Standards for electric utility boilers, US EPA requires much more	Given length of section, summary paragraph is not considered necessary. Reference to differential approach for new and existing facilities is now included in the introduction.

		stringent emission standards for new facilities than for existing facilities. Therefore, it is reasonable that BAT/BEP as required for new facilities should be substantially more stringent than the requirements for existing facilities. Also shown are two tables comparing emission limits for new (or reconstructed) industrial boilers with emission limits for existing industrial boilers. [ENVIRONMENTAL PROTECTION AGENCY 40 CFR Part 63 [EPA–HQ–OAR–2002–0058; FRL–9676–8]]" (note – tables provided in submission) This section links guidance to identification of BAT. Comparable to section 5 of cement draft. "new" vs "existing" required by para 8(a)	
ZMWG	Coal – Section 5.2	*Modify:* "Effective pollution control management strategies, well-maintained facilities, well-trained operators, and constant attention to the process are all important factors in controlling and where feasible, reducing the emissions of mercury from coal combustion. As such, these practices, applicable to existing and new sources, are considered to be the BEPs, **and should be performed in a manner which facilitates and ensures compliance with BAT associated levels of control or emissions."** *Rationale: BEP and BAT are complementary whilst the intended outcome should be the same. It is important to give guidance on what "best" could mean in this context.*	Partially reflected, although reference to BAT associated levels removed.
United States	Section 5.2.2, paragraph 1 L1	- Should read "**The** energy efficiency of **a** coal-fired power plant…"	Addressed
United States	Section 5.2.2, paragraph 1 L8	- Should read "…only about half **of** new coal-fired power plants..."	Addressed
United States	Section 5.2.2, paragraph 1 L1-2	- Revise to read "As plants age their efficiency decreases, ~~causing the need for~~ **requiring** more coal to generate the same output"	Addressed
United States	Section 5.2.2, paragraph 1 L1-2	- Should read "…new blading for turbines, overhaul/upgrade of **the** condenser, new packing for **the** cooling tower…"	Addressed
United States	Section 5.2.5	Environmentally sound management of coal combustion residues – suggest the following changes in 2nd and 3rd sentences - "Sludge from wet FGD and other CCRs are either stored at the site or reused, including further processing of FGD into gypsum wallboard. In the latter case, after FGD gypsum has been filtered out of the sludge, mercury may need to be extracted from FGD wastewater effluent, depending on the levels present."	Addressed
United States	Section 5.2.5	Suggest the following for the para referenced above "However, another study by Liu et al. (2013) indicated that 12-55 per cent of total mercury in the FGD gypsum would be emitted during wallboard production, and a third study found releases ranging from 2% to 66% of the mercury in the incoming FGD gypsum (Sanderson et.al, 2008). Given the potential variability in release rates, wallboard production using FGD gypsum is not regarded as BEPs unless the mercury re-emissions are shown to be minimal or are captured during the wallboard production."	Addressed

United States	Section 5.2.5, fifth sentence, 3rd para	. : "In these same studies, **some** ~~the~~ leach results for other heavy metals, such as arsenic, were found to exceed existing standards for concentration in well water in the United States."	Addressed
United States	Section 5.2.3, L2-4	- Rearrange awkward sentence beginning with "This incremental amount of mercury removal...."	Addressed
United States	Section 5.2.5, paragraph 1 L1	- "Mercury" should be lower case	Addressed
United States	Section 5.2.5, paragraph 2 L7	- "Mercury" should be lower case	Addressed
United States	Section 5.2.5, paragraph 2 L13	- Delete extra period	Addressed
NRDC	Coal, section 6, chapeau	Insert after final sentence of chapeau: Among other forms of mercury emission monitoring and measurement, Continuous Emission Monitoring Systems (CEMS) for mercury are discussed. Mercury CEMS take a continuous sample of the stack or chimney exhaust gas after any pollution controls and provide a measure of mercury emissions from that stack or chimney	Information already included in the section, however text clarified as needed.
Energy Supply Association of Australia (ESAA)	Coal Section 6	Give consideration to the inclusion of typical costs for CEMS and other types of monitoring methodologies as they relate to mercury emissions, given installation and operating costs can be substantial.	Some relative cost references are included in the introduction, but not dollar values due to different costs in different countries.
Canada (SaskPower)	Section 6.1	*"It uses a technique of sample gas acceleration and relies on the inertial forces of the particulate and a sintered filter to separate the gas and particulates."* Suggest mentioning that inertial filters contribute significantly to high maintenance requirements of CEMs and are being replaced by simpler systems.	In the location referenced and for the purpose of process optimisation, simpler systems are not appropriate.
Canada (SaskPower)	Section 6.1	Include mention that CEMs for Hg are more complex than CEMs for other substances and maintenance may, depending on the environment, become impractical. Some can determine speciated Hg, but this makes them more challenging than CEMs for gas phase Hg.	Monitoring for other substances is outside the mandate. Maintenance is included in the introductory section.
United States	Section 6.1	The elements described in the third paragraph as being special considerations are standard procedure, called "blowback" used to keep probes clean of water and particulate. Heated sampling lines and probes are used regardless of gas stream moisture content. For wet gas streams, dilution probes are used to handle wet gas streams in order to prevent condensation of water and loss of Hg in the sample. Please add the following reference: (Sanderson et.al., Fate of Mercury in Synthetic Gypsum Used for Wallboard Production, USG Corporation, 2008) available at:	Addressed by editing to remove special considerations. Edited to clarify reference to heated sample lines.

		https://www.netl.doe.gov/File%20Library/Research/Coal/ewr/42080FinalRpt20080624.pdf	
NRDC	Coal, section 6.1	Amend section heading to include “Using Mercury Analyzers”	Not changed, in order to retain consistency with other source categories
NRDC	Coal, section 6.1, first paragraph	Insert: “Continuous Emission Monitoring Systems (CEMS) may use Hg analyzers and these are used at hundreds of US electric utility systems for continuous monitoring of gaseous mercury emissions” before first sentence. Delete “CEM instruments” from next sentence, then delete ‘for emission compliance systems and insert “~~For emission compliance purposes,~~The analyzer methods that are most widely used only measure elemental mercury. Therefore the mercury CEMS systems must include a converter that converts oxidized mercury to elemental mercury. The most common approach is thermal conversion. The CEMS includes a complete sampling, sample conditioning and conversion, zero air supply (for the dilution proble) and calibration system as well as a data acquisition system.”	Detailed information on CEMS in Introduction – additional information not included to avoid redundancy.
NRDC	Coal, section 6.1, first paragraph	Amend : "~~CEM instruments are located in the~~ **The CEMS system samples the gases at** the stack and measure a low particulate concentration gas stream. **The remaining particulate matter in the gas stream is filtered out of the sample. Hg CEMS analyzer systems are used on a wide range of facilities, including facilities with wet FGD systems, dry FGD systems, and systems with only PM control. Some facilities use inertial filters, but CEMS sampling systems equipped with a fixed filter having a regular cleaning cycle are increasingly popular in the United States due to their smaller size and simplicity.”** Note that analyzers not located at the stack are not CEMS but are process analyzers.	Not included - repetition of information presented elsewhere.
NRDC	Coal, section 6.1, paragraph 2	**“ Because particulate matter is filtered out, Hg analyzer CEMS only measure the gaseous components of mercury emissions, which are what is regulated in the United States.** **Because the averaging period for these analyzer systems is brief (typically a few minutes or less) these analyzers provide real-time or near real-time data and the CEMS may therefore be used for process control and performance testing as well as stack monitoring. While the CEMS analyzer systems are commonly used for stack emissions monitoring after the pollution control devices, in some cases, especially for testing purposes,** ~~For mercury control purposes, CEMs~~ analyzers ~~are sometimes~~ have also been used to sample the particulate-laden gas stream before a particulate control device **to help assess the capture of mercury across that particulate control device.** ~~A commonly used filter probe technology for this purpose is the inertial filter. It uses a technique of sample gas acceleration and relies on the inertial forces of the particulate and a sintered filter to separate the gas and particulates.”~~	Not included - repetition of information presented elsewhere.
NRDC	Coal, section 6.1, paragraphs 3 and 4	“~~CEM monitoring of sample gas saturated with water by a wet scrubber is commonly practiced although it requires special considerations. A special fixed filter probe is used to~~	Additional details in introduction, no more

		~~avoid blockage from condensation of *water* and typically employs a frequent filter media cleaning cycle using compressed air. Heated sample lines are used with careful regulation of sample gas temperature to avoid condensation of water and the resulting absorption of oxidized mercury into this water....~~ A CEMS **analyzer** provides the coal combustion operator with real time **or** **near real-time** mercury analysis **data, which is what makes them useful for process control. Experience has shown that mercury emissions can be highly variable, depending upon coal characteristics, and plant operating characteristics. The advantage of having real-time monitoring is that the facility owner can identify situations where mercury emissions increase and take corrective action to mitigate mercury emissions.** Which can **These may** be used in **in the form** of a feedback loop with the sorbent injection or coal additive feed equipment **or it could be in the form of direct operational changes that reduce those high mercury emitting situations in the future.** This feature allows tight control over the mercury emission concentration despite changes of mercury concentration in the fuel… The CEMS **analyzer systems** also provides the advantages of sensitivity to low concentrations of mercury, down to **below** 0.5 ug/m3, speciated mercury measurements, and high repeatability of results when calibrated with a dynamic mercury spiking methodology. **These mercury CEMS analyzers offer the ability to perform complete system integrity checks with both elemental and oxidized Hg…** ~~Semi-continuous emission monitors (SCEM), which are often labeled as CEM, are commonly used to overcome interference from other gases in the sample stream. These instruments provide mercury concentration averages over a short sample periods, which are typically less than 5 minutes. The short sample period averages provide adequate data in almost all situations.~~ **While CEMS analyzers provide the advantage of real-time data, they have the disadvantage of having the highest initial cost and they require capable instrument technicians "** Note that SCEM is not recognized by industry. Put this in the context of averaging time for measurements as has been done earlier in the section. Additional text to explain benefits of analyser systems and improve accuracy.	detailed information needed. Noted in original text that SCEM is now referred to as CEM. No additional changes needed.
NRDC	Coal, Section 6.2	Revise section heading as follows: "**Continuous Emission Monitoring with** Sorbent Trap **Systems and Periodic** Monitoring **with Sorbent Trap Systems"**	Not consistent with terminology in introduction.
NRDC	Coal, Section 6.2, sentence 1	Add "**It is possible to monitor using one set of traps over a sampling period lasting several days or several hours in coal combustion plants, depending upon the size of the trap used and the sampling rate"** after first sentence.	Already included in introductory text.
NRDC	Coal, Section 6.2, sentence 2	Amend as "In the US, these advantages have resulted in many coal combustion facilities performing their own monitoring using sorbent traps **using these systems as part of a Continuous Emission Monitoring System and also for short-term testing**~~. It is possible to monitor using one set of traps over a sampling period lasting several days in coal combustion plants."~~	Not consistent with terminology in introduction.

NRDC	Coal, Section 6.2	Add text at end : **“Through regular replacement of sorbent traps so that emissions are continuously monitored, sorbent traps can provide continuous mercury emissions measurements in a mercury CEMS. While generally less expensive in initial cost than analyzer CEMS and simpler to set up, the disadvantages compared to analyzer CEMS for continuous monitoring are that: 1) they do not provide real-time or near real-time data, and cannot be used for process control; 2) there is a risk of lost data if a sample from a period of several days does not meet quality assurance needs; 3) when used as a mercury CEMS there is a substantial amount of consumable materials that must be purchased over time as well as labor and laboratory services.** **In principle, sorbent trap measurements measure total mercury of all mercury species because the mercury in the inlet wool is included in the analysis. Some suppliers offer traps intended to measure speciated mercury measurements; however, there is limited data on the use of these.** **Because sorbent traps can be quickly set up for testing, sorbent trap methods are the most commonly used method for performing short-term testing, such as Relative Accuracy Test Audits (RATAs) of mercury CEMS. Sorbent trap mercury measurements will also include mercury that may be included in the particle matter that passes through the air pollution controls as well as the gaseous mercury emissions. This can contribute to differences between the measurements of Hg CEMS analyzers, which only measure gaseous mercury, and sorbent trap measurements.”**	Not consistent with terminology in introduction
NRDC	Coal, Section 6.3, sentence one	Amend: ~~The~~ **Prior to the availability of CEMS instruments and sorbent traps, the** use of impinger methods for mercury monitoring in coal combustion plants ~~has historically been~~ **was once** the prominent method.”	Not amended as group considered original text was suitable.
NRDC	Coal, Section 6.3, third para	Add: **“Impinger methods have several disadvantages: 1) they only give an indication of mercury emission at one time and thus are not suitable for continuous measurement of mercury emissions; 2) they require very labor-intensive sampling and laboratory efforts. For these reasons impinger methods are generally not used in commercial settings, but for research purposes only.”**	Disadvantages of these methods covered briefly in introductory text.

Canada (SaskPower)	Section 6.4	"*...a mass balance method for mercury air emission monitoring in coal combustion plants may be more difficult than a direct flue gas monitoring method*." Suggest rewriting to mention that mass balances are sometimes more effective when other monitoring is problematic, and vice versa.	It is considered that the gas monitoring methods available provide adequate monitoring making mass balance inadequate.
United States	Section 6.4, paragraph 1 L2-3	- Rearrange to read "…are not a direct monitoring method for mercury air emissions and it can be expected that the accuracy of air emissions calculated from mass balance will be low"	Addressed
NRDC	Coal, Section 6.4	The comment regarding the variation in the mercury content of the coal is correct, and should be considered in possible amendment to Table 3, also relevant to comments in sections 6.5 and 6.6..	Already addressed in relation to table 3.
Canada (SaskPower)	Section 6.5	"*...but due to the wide mercury content variation of coal, it is not an accurate means of monitoring mercury air emissions.*" Suggest rewriting. PEMS can be efficient when coal comes from a single source. Can also be useful compliment to CEMS.	Introductory text relating to predictive monitoring has been amended by the Group, however the text in the coal chapter is retained as it was considered accurate.. Mercury levels may vary even from a single source
NRDC	Coal, Section 6.5	Add 'or other' between sorbent trap and monitoring activities.	Addressed
Iran	Coal	No information on maintenance	Addressed
Energy Supply Association of Australia (ESAA)	Coal – section 6.6	The comment in section 6.6 relating to the use of emissions factors appears to play down the use of emissions factors.	Text specifies that these are only an estimation tool.
United States	References	Recommend including an additional reference: USEPA, UNEP and Swedish Environmental Institute (2014). Mercury Emissions Capture Efficiency with Activated Carbon Injection at a Russian Coal-Fired Power Plant, prepared by All Russia Thermal Engineering Institute (VTI) and Zelinsky Institute of Organic Chemistry, Moscow EPA600/r-14/299/September 2014.	Addressed

Waste			
Eco-Accord	Waste – general	Information on alternatives to waste incineration should be included as an annex.	Note that the mandate for the guidance is for mercury emissions from waste incineration. Wastes are covered under Article 11 of the Convention, and alternatives to incineration are included in the Basel guidelines, as well as being referenced in waste section.
Eco-Accord	Waste – site selection	The guidance notes that appropriate selection of site is important, but more information should be included on site identification, particularly the social, health and environmental consequences.	Noted – and text edited to clarify
Eco-Accord	Waste	The need for dedicated landfills for safe ash storage is noted, however the hazards of using waste incineration residues containing hazardous substances in construction materials should be highlighted.	Comment reflected in revised section on boiler ash use
National Toxics Network	Waste incineration	This focuses on the better operation of waste incinerators with very little material on alternatives. This is not a balanced representation. In particular, the section of alternatives to medical waste incineration should be more fully developed. Also alternative to incineration of municipal waste and hazardous wastes should be more developed, and guidance on zero waste strategies should be provided.	Note that the mandate for the guidance is for mercury emissions from waste incineration. Wastes are covered under Article 11 of the Convention, and alternatives to incineration are included in the Basel guidelines, as well as being referenced in waste section.
National Toxics Network	Waste incineration summary	The summary includes the statement "mercury emission levels in air emissions not higher than 1-10 µg /m^3 (at 11 per cent O_2) are associated with best available techniques.", however Figure 9 shows levels significantly higher than this. There appears to be inconsistency between the summary text, and the figure used to demonstrate this, and the figure may not be appropriate.	This is a misinterpretation of figure 9. The figure shows illegal input of mercury into incinerator
Canada	Waste: Summary – last paragraph	For batch waste incinerators, some of the BAT/BEP presented may apply, particularly the more general practices. This document seems to focus mainly on continuous systems. More specific information for batch systems should be included.	Batch processes are not the best option (start and shut down emit at high levels see 2.2.3)
Canada	Waste: Summary – last paragraph	This could cause some confusion that these are target emission limit values. Please add a footnote to clarify that emission limit values (ELVs) mentioned in the guidelines are meant as an indication of emission performance that can be achieved using BAT, and are not requirements or targets.	noted

United States	Waste incineration facilities – summary, last paragraph	Clarity on the characterization of indicative performance values is needed. There is no requirement in the Convention to meet an emission limit value, and the application of the techniques may not necessarily achieve the indicative performance values.	The text does not prescribe emission values (ELV), it simply provides indicative performance values
ZMWG	Waste incineration facilities - Summary	Amend range of emission limit values from 1-10 µg/m^3 (at 11 per cent O_2) to **1- 3 µg/m^3** (at 11 per cent O_2)	The range 1-10 is retained as an indicative value although it is recognized that some European experience achieved 1-3
NRDC	Waste, summary, paragraph 7	Insert “**Accordingly, Parties should maximize the use of non-incineration alternatives when applying BAT BEP to small incinerators »** to the end of the paragraph	As there is no definition of “small incinerators” in the main document, this is not included.
China	Waste (General)	Suggest improving the clarity, including the distinction between BAT and BEP, in this document.	Addressed
China	Waste (General)	Any reference to the Basel convention technical guidance should refer to the latest version of this document.	Addressed
CREPD	Waste incineration (general)	There is unbalanced presentation of information between incineration technologies and non incineration technologies. A balance is important to ensure that the guidance document on BAT/BEP will effectively guide ALL the Parties in selecting and implementing BAT/BEP in their circumstances. For the developing countries facing challenges in securing a sufficient power supply to “run incinerators” properly, and considering the size of inferred mercury contaminated wastes generated compared to industrialized world, it is important that information on specific alternative technologies be included at least in the annex to the Guidelines.	The mandate of the guidance is to address reduction of emissions from incineration techniques. Alternative techniques are introduced in 3.7. The text provides a cross reference to Stockholm Convention BAT/BEP guidance, and to Compendium of technologies for treatment/destruction of health (Emmanuel 2012)
China	Waste, Summary	Suggest deleting last para, in order to move away from a specific ELV. Suggest to instead move focus on removal efficiency of different techniques and their combinations.	The paragraph mentions mercury emissions to air, not ELVs. This has been edited for clarity. Removal efficiencies are covered in the introduction section.
Japan	Waste	change the expression in the summary stating “With a suitable combination of primary and secondary measures, mercury emission levels in air emissions not higher than 1-10 µg/m^3 (at 11 per cent O_2) are associated with best available techniques” to “With a suitable combination of primary and secondary measures, mercury emission levels in air emissions in most cases are lower than 20 µg/m^3 (daily average value or yearly average value).” It is also important to add the point “data on mercury concentrations of flue gas have a large deviation” to the summary.	The range 1-10 is retained, although it is recognized that some European experience achieved 1-3

Japan	Waste	Data supplied on actual yearly average of mercury flue gas from waste incinerators.	Noted
Canada	Waste – Introduction	Government of Prince Edward Island – small medical waste facilities have not been considered as candidate for mercury waste reduction given size, intermittent operation and cost to retrofit.	Noted – additionally under para 2b a Party has discretion in identifying relevant sources within a source category
Canada	Waste – Introduction	Government of Prince Edward Island – municipal waste incineration plant also provides heating	For information – no amendment to document needed
Canada	Waste – Introduction	Level of 10 µg /m^3 are seen with one facility – retain this range	Noted
ZMWG	Waste incineration facilities, introduction	Expand explanation of open burning with following amended text: **The** burning of any type of waste in the open air, in open dumps, and in **simply constructed** incineration devices **range from "drum incinerators" to locally-constructed incinerators with no pollution control to burning of medical waste in small ovens** and do not allow for complete combustion. **Open burning of waste mercury and mercury-added products contribute significantly to releases of mercury from products. Therefore, burning** is considered 'bad environmental practice' and should be discouraged as it can lead to emissions of toxic substances into the environment. Open burning **and burning in simply constructed incineration devices isn't** covered further in this guidance	Accepted
Canada	Waste 2.1 title	Consider what types of waste contain mercury	No specific amendment needed to address this comment as additional information has been provided in the document
United States	Waste incineration facilities, Section 2.1.1	Reuse of waste – note that wastes are not reused, materials are reused. The first and second sentences are conflicting and should be consistent. Prefer to refer to 'reuse of materials' or 'reuse of materials and wastes'. Final sentence should be clarified as to why or how care should be taken. Materials contaminated with mercury should not be reused.	Edited to reflect the clarification
Canada	Waste 2.1.1	Reuse with little or no processing is often called direct reuse	Text edited.
Canada	Waste: 2.1.1	These definitions will need to be re-visited after the Basel Convention review of definitions is completed replace last sentence with "Landfilling is the most common form of final waste disposal~~and the final disposal option~~.	Addressed

China	Waste, 2.1.2	Suggest adding "common industrial wastes" into an "other" category, and moving 2.1.2.3 and 2.1.2.6 into the "other" category.	A new sub-section "Common Industrial Waste" has been included. Sub-section 2.1.2.3 and 2.1.2.6 are kept separate because of their significance.
United States	Waste incineration facilities 2.1.2.1, para 2	Municipal waste – the para is unclear and should be deleted. It does not provide additional information and uses vague phrases.	The paragraph has been rephrased and moved to BEP section 5.6.1
United States	Waste incineration facilities section 2.1.2.6	Scrap wood – last sentence - Contaminated wood should not always be incinerated. The wood may be less likely to leach the heavy metals in a landfill environment. This sentence should read, "Regulatory officials should evaluate whether it is more appropriate to landfill or incinerate contaminated wood, depending on the potential for negative environmental impacts of each option."	The paragraph is amended to reflect the option of landfill.
Canada	Waste: 2.1.2.2	this paragraph needs some references to sources of mercury in hazardous wastes.; should be more specific; also the Basel Convention technical guidelines for mercury wastes should be added.	Addressed
Canada	Waste 2.1.2.2	Amend to read "Hazardous waste ~~is a waste that~~ has the potential…". Last sentence add "…and information on wastes considered hazardous and the scope of mercury waste covered under that convention."	accepted
Canada	Waste 2.1.2.4 2nd paragraph	Amend 3rd sentence to read "Hazardous medical waste can also include chemicals, ~~both medical and industrial~~"	accepted
Canada	Waste – Section 2.2.1	Note that some substances may be created during incineration (not mercury).	noted
Canada	Waste 2.2.1 2nd paragraph	add "…medical waste…" to the last sentence	accepted
Canada	Waste 2.2.1 6th paragraph	Please check the reference. Section 3.7 does not seem to address sinks for mercury	noted
Canada	Waste 2.2.2 3rd sub-section	"screened out plastics are passed for incineration" – not clear what this means	Addressed
United States	Waste incineration 2.2.4.1, 1st para	Comma needed after' disposal of municipal solid waste'.	Addressed
Norway	Waste, 3	Suggest inclusion of information on selenium filters under emission control techniques.	Not included as additional information was not provided
SARP Industries	Waste 3, page 21	wet scrubbing techniques, cross media effects -- the following issue, which is often forgotten, should be added: The injection of sulfur compounds may lead to H_2S formation in presence of HCl. H_2S may induce corrosion in the ductwork and FG detection system.	Insufficient time to research the statement – no amendmenr

Norway	Waste, 3	Norway confirms that combining two or three of the currently listed technologies, very small Hg emissions (1-2µg/Nm3) can be achieved.	Reflected in last sentence of the Summary
Canada	Waste 3.2 2nd paragraph	Replace "complexating" with "complexing"?	Accepted
SARP Industries	Waste 3.3 page 23	activated carbon, cross media effects, the following should be added : Feedback on the dioxins and furans emissions control efficiency with impregnated activated carbon needs to be more reported.	The intent of the comment is not clear; there is already a reference to the EC waste incineration BREF, 2006
Canada	Waste 3.3 2nd paragraph	'. As last step of a flue gas cleaning, as well established is a dosing of carbon based adsorbents in the flue gas before a downstream fabric filter, e.g. after a scrubber' Awkward phrasing. Is this saying that a dosing of carbon based adsorbents in flue gas before fabric filter is a well established last step of flue cleaning?	Edited to clarify meaning
Canada	Waste 3.3 10th paragraph	re the €50,000 – should these values not be expressed as a value per tonne of waste, or a value per year rather than a flat cost?	Edited to clarify costs
SARP Industries	Waste 3.3	*Costs of Installation and Operation*: activated carbon, cost of installation and operation -- costs are largely underestimated, and should be replaced as follows : Brominated AC costs approximatively € 2,000/t.	Not accepted – costs in the paper are in the same range
SARP Industries	Waste 3.4	the title should be more specific Kiln/Post Combustion Chamber bromide addition, and in the text where there is a reference to an article from Xavier Chaucherie (SARP Industries), the following should be added : "as the activated carbon efficiency was greatly increased in presence of almost only oxidized mercury. " Or else the statement is not correct and does not capture what is stated in the publication.	Title considered as appropriate; suggested addition of text accepted with minor editing
Canada	Waste 3.4 5th paragraph	Polybrominated dioxins and polyhalogenated dioxins and furans are undesirable, and may require efforts to control emissions. It should be noted that emissions of these substances will need to be managed	Accepted with minor editing
Canada	Waste 3.6 1st paragraph	End of the paragraph, replace with "…of leaching or ~~distribution through~~ releases to the environment…"	Accepted

Canada	Waste 3.6 3rd paragraph	3rd sentence replace with "…~~Especially a~~Air pollution control residues should be treated in a way to avoid additional evaporation or ~~leaking~~ leaching of mercury and its compounds to the environment…"	Accepted
Canada	Waste 3.6.1	3rd line replace with "…residues may provide…"	Accepted
Canada	Waste 3.6.2 last paragraph	Replace last sentence with "…More detailed information on the management of waste incinerator residues containing mercury ~~management~~ can be found in the Basel Convention ESM technical guidance for mercury wastes (Basel Convention Secretariat 2015)	Accepted
Canada	Waste 3.6.3	1st line replace "never" with "not"; 5th & 6th sentences replace with "…Use of waste incineration residues for construction purposes ~~is also very problematic and cannot be considered as best environmental practice. There are examples which demonstrate that such practice can lead to serious environment contamination by~~ have potential environmental risks due to contamination of heavy metals	Accepted with editing (see 3.7.3)
United States	Waste incineration facilities section 3.6	Inconsistency between section 3.6.1 and 3.6.3 re the reuse of bottom ash in construction.	Redrafting of sub-sections under Section 3.6 to improve consistency.
China	Waste, 3.6.5	Suggest rewriting "*Any residues containing or contaminated with mercury should not be recycled*", as this statement is too strong. Some waste can be recycled, and indicate which conditions would render it impossible to recycle the waste.	Rephrased and recycling of materials taken into account
United States	Waste incineration facilities 3.6.5	Final disposal of residues, 1st sentence – sentence is too broad – residues with mercury over a certain threshold should not be recycled, but low levels and de minimis amounts may be recycled.	Rephrased and recycling of materials taken into account
Canada	Waste 3.7 1st paragraph	2nd sentence, replace with "…compounds, ~~but maintain control over the~~ while controlling potential releases of residual mercury	Accepted
Canada	Waste 3.7 3rd paragraph	Re the four dot points, it is not clear why the alternative methods to incineration are listed. These alternatives by themselves would not control potential mercury emissions/releases from medical waste containing or contaminated with mercury.	Text added to clarify and reference statement

Canada	Waste 4.1 3rd paragraph	3rd sentence: the reference to "…A large decreased in activated carbon use is possible…" it is not clear. Is it trying to say that smaller amounts of activated carbon can be used by this technique compared to ACI?	Edited to clarify
Canada	Waste 4.2	Co-benefits – This needs to be further qualified. Coconut char contaminated with mercury will still need to be properly disposed	Edited to clarify
China	Waste, 5.1	Suggest deleting third para of 5.1 and avoid ELV targets. Suggest to instead move focus on removal efficiency of different techniques and their combinations	Not an ELV see 5.5.2
NRDC	Waste, section 5.1, paragraph 3	A distinction should be made between new and existing facilities as required by paragraph 8a of article 8. Detail and reference provided in submissions	Remark on achievable levels for new plants added
NRDC	Waste, section 5.1, paragraph 4	Add the following at the end of the paragraph: **« Parties should pursue non-incineration alternatives where the cost of compliance with BAT is challenging, such as applying BAT to small medical waste incinerators."**	Accepted
United States	Waste incineration facilities 5.2	Waste incineration facilities – last para discusses non-incineration techniques, and refers to section 4 indicating it discusses alternatives to incineration. Section 4 does not include any alternatives to incineration.	Addressed
Canada	Waste 5.4	"consideration" should be "considerations"	Accepted
United States	Waste incineration facilities, 5.4	Waste incineration facilities – introductory paragraph indicates benefits for mercury reduction from unburnt carbon in the flue gas. Document should not suggest a lower combustion efficiency than can be achieved. Note that BAT section discusses the use of carbon injection as a gas treatment.	Accepted
China	Waste, 5.4 and 5.5	Suggest focusing on applicable incineration techniques and move content on company management/regulation to BEP.	Heading for the section revised
China	Waste, 5.4.1	Suggest increased focus on mercury control in this section, which currently appears to focus on dioxins.	Section is seen as precurser to Hg discussion
Singapore	Waste, 5.4.4	Suggest inclusion of example in Waste section or in the case study of incineration of sewage sludge from an adjacent or connected sewage treatment plant (one example is an AEB Amsterdam plant)	Location of sewage plant is considered not relevant to Hg emissions

Canada	Waste 5.4.5	2nd bullet: "fed" should be "feed". Replace last bullet with "Medical waste can be incinerated in municipal waste incinerators using the grate type of incinerator, although some special adaptations have to be made. If infectious medical ~~care~~ waste is to be burnt in a municipal waste incinerator, it has to be disinfected and sterilized beforehand or fed into the incinerator in appropriate containers by automatic loading (Eberhartinger, 2004). Previous mixing of medical waste containing or contaminated with mercury with other waste types and direct handling ~~has to~~ should be avoided."	Accepted
ZMWG	Waste incineration facilities – waste water releases	Add a section on waste water releases: **Emission levels of mercury to water <0.05 µg/l (yearly) and 0.2-0.3µg/l (daily averaged) after the wastewater treatment plant from flue gas cleaning is achieved, such as by membrane filtration. The values are based on 24-hour flow-proportional composite samples. Mercury emission to water should be prevented e.g. through Zero Liquid Discharge Techniques due to environmental quality standards and compliance with the OSPAR Convention.** Rationale: This issue of mercury sinks / release to water needs to be further developed in this section. WetFGD are the common SO2 abatement in the EU and there are techniques to ensure Hg capture in the wastewater of the FGD unit e.g. membrane filtration or ion exchange. Simple transfers of mercury release from air to water should not be prevented. The levels are based on evidence provided by the EEB showing that emission levels of mercury < 0.05µg/l (yearly average) prior to wastewater release are achieved. Significant emission reductions are necessary for the compliance to the OSPAR Convention	Noted - this is a cross-media issue, information noted, however no reference was provided and so the information could not be included.
Singapore	Waste, 5.5	Suggest revision of the statement that FFs in combination with dry or wet methods for controlling volatiles are BAT. Suggest a more nuanced recommendation, where the O&M costs of FFs and the advantages of combining FFs with ESPs are included.	1st sentence edited to reflect the nuance. See para 9 etc

Canada	Waste 5.5 1st paragraph	2^{nd} and 3^{rd} sentences, replace "sources" with "facilities"	Accepted
Canada	Waste 5.5 2^{nd} paragraph	3^{rd} sentence: "…but in comparison to FF they have disadvantages especially when the FF is pre-coated with activated carbon to achieve a good abatement directly after the startup phase using the pre-coating for adsorption of volatile pollutants…" - awkward phrasing	Edited to clarify
Canada	Waste 5.5 7th paragraph	Replace start of paragraph with "~~Especially at~~ At low concentrations…"	Accepted
Canada	Waste 5.5 8th paragraph	Is this all there is for this paragraph? Perhaps a reference to another part of the document could be given here	Sentence moved to end of 3rd paragraph
Canada	Waste 5.5 9th paragraph	2^{nd} sentence: Not clear what ranges this refers to, given that it states (in the preceding sentence) there being a concentration of mercury below 10 µg/m³ reported.	Edited to clarify
Canada	Waste 5.5.1	Header should be on the same page as the table	Accepted
Canada	Waste 5.5.1 1st paragraph	1^{st} sentence: not clear what "requirements" this refers to 3^{rd} sentence: replace "…have to be…" with "are" 4^{th} sentence: replace with "~~For minimization of~~ To minimize potential fire hazards a mixture with limestone reagents ~~is useful~~ may be used.	Edited to clarify Accepted Accepted
Canada	Waste 5.5.1 3rd paragraph	Re the reference "…and is also relatively expensive…", is this because security/safety measures add to the cost of this installation? Please clarify.	Edited to clarify
NRDC	Waste, section 5.5.2, paragraph 2	Observations should be included differentiating between new and existing facilities regarding emission levels achieved. Can new facilities typically meet 2.5 or lower, and thus should this be considered an appropriate BAT level of control for new (large) facilities.	Noted
Canada	Waste 5.5.2 4th paragraph	2^{nd} sentence: Not clear what this statement is trying to say. Not clear what is being compared. "Very high" compared to what? Emissions may depend on the mercury content of the waste input	Paragraph has been deleted
Canada	Waste.5.5.2 5th paragraph	Does WI stand for waste incineration? A list of acronyms and full names would be helpful.	Accepted
SARP Industries	Waste 5.5.2 Page 39	Table 4: one must be very specific when indicating emission levels, therefore the column "mercury concentration in the exhaust gas" should be completed with the measuring period to which the concentration corresponds (for instance: 6 hours spot control, 8 hours spot controls, yearly average, ...)	Table deleted

Canada	Waste 5.6	10th bullet point: what kinds of restrictions or bans?	Edited to clarify
National Toxics Network	Waste incineration - Section 5.6 final dot point	This is inappropriate – most incinerator projects have a deficit of public goodwill due to history of mismanagement and pollution. The inclusion of this point indicates an acceptance that incineration is promoted over other techniques, and the point should be deleted.	Edited to clarify
China	Waste, 5.6	Suggest rewriting this section to focus solely on BEP for reducing Hg emissions.	Clarification in relation to BEP included
United States	Waste incineration facilities, 5.6	Introduction to BEP – many bullets are very broad, not helpful, duplicative of information in section 5.6.1. They should be integrated into 5.6.1. proposed changes in bullets:	
		• 1st bullet - "Installations" is unclear; we suggest changing it to "incinerators."	Accepted
		• 4th bullet - It is unclear how labeling would help in this situation. Removing this bullet and adding some examples to the 2nd bullet on information and education to the public would improve the clarity of this section. The 2nd bullet could include text such as, "(e.g. through labeling of mercury-containing products, etc.)".	Noted – additional text to clarify
		• 5th bullet - "Saving resources, including energy" is too broad and unhelpful. It should be removed.	Edited to clarify
		• 6th bullet - "Making collection and disposal systems available to the public" is also unhelpful. Perhaps it could be rephrased as, "integrating waste collection and disposal systems into residential, commercial, and industrial processes to ensure that all waste is managed in an environmentally sound manner".	Accepted
		• 9th and 10th bullets - These bullets are duplicative of the 7th bullet. They should be removed and examples could be included in the 7th bullet, such as: "(e.g. through restrictions, bans, economic incentives, certifications, standards, or other policy tools)".	Accepted

Canada	Waste 5.6.1.1 1st paragraph	1st sentence: delete "…of by any means…"	Accepted
Canada	Waste 5.6.1.1 2nd paragraph	Replace 1st and 2nd sentences with "In many industrialized countries, health care institutions have begun to phase-out mercury uses and phase-in effective alternative products or devices that avoid the use of mercury. A co-benefit of mercury-free alternatives is ~~to~~ a ~~reduce~~ reduction of the generation of mercury containing waste	Accepted
Canada	Waste 5.6.1.2 1st paragraph	Replace 1st and 2nd sentences with "~~The only relevant primary technique for preventing emissions of mercury into the air before incinerating are those that control or prevent, if possible, the inclusion of mercury in waste.~~ The control or prevention of the inclusion of mercury in wastes inputs serves to reduce the overall mercury emissions from incineration. Therefore, measures to exclude mercury from waste inputs are of special importance.	Accepted
Canada	Waste 5.6.1.1 2nd paragraph	Replace 1st sentence with: "The separate collection of waste streams, some of which could potentially be contaminated with high amounts of mercury, and the diversion of mercury-containing waste to proper management facilities can lead to a significant reduction of the mercury content in the waste~~, which can, thereafter, be burnt in a waste~~ going to incineration ~~plant~~." Replace 2nd sentence with "T~~his includes~~ There could be separate collection for the following wastes: Delete "Separate collection of.." from the bullet points	Accepted Accepted Accepted
Canada	Waste 5.6.1.3 2nd paragraph	3rd sentence: insert "…prior to incineration..:" after "…waste stream or reidues…" and delete "final" 4th sentence: replace "Checking" with "inspection" and insert "routinely" before performed. 6th and 7th sentences: replace with "Manifests and audit trails ~~are important to~~ should be maintained and ~~they should be~~ kept updated. Table 5 illustrates some of the inspection techniques applicable to the different types of waste.	Accepted Accepted Accepted
Canada	Waste 5.6.1.4	Replace paragraph with "The removal of both ferrous and non-ferrous metals on site is a common practice at municipal solid waste incinerators, and helps to prevent these wastes, ~~potentially containing~~ which may contain	Accepted

		mercury as an impurity, ~~to~~ from entering waste incineration.	
Canada	Waste 5.6.1.5	Table 6 Sewage sludge: clarify meaning of "…require segregation for blending…"	Table deleted
Canada	Waste 5.6.1.6	Replace second part of sentence with "…~~stored wastes are unlikely to improve with age~~ the accumulation and storage of a given waste for a long period of time is undesirable."	Accepted
Canada	Waste 5.6.1.7	To remove repetition with sub-section 5.6.1.9, can 5.6.1.7 be combined with 5.6.1.9? Replace second part of the sentence with "…~~to ensure that the design parameters of the incinerator are being met~~ it is appropriate for use as inputs for which the incinerator was designed to handle	Accepted
Canada	Waste 5.6.1.8 2nd paragraph	Not clear why the second paragraph and its bullet points are included	Noted - deleted
Canada	Waste 5.6.1.9	2nd sentence: repetitive of sub-section 5.6.1.7. To remove repetition with sub-section 5.6.1.9, can sub-section 5.6.1.7 be combined with 5.6.1.9?	Sub -section 5.6.1.7 deleted
Canada	Waste 5.6.1.11	delete "destruction" from last line	Accepted
Canada	Waste 5.6.1.12	5th line delete "both"	Accepted
National Toxics Network	Waste incineration - Section 6.1	The recommendation to add bromine raises the problem of generation of PBDD and PBDF, and should not be included in the guidance.	This is an applied technique – caveats are mentioned
Canada	Waste 6.1 3rd paragraph	replace with "Despite ~~various~~ measures to control or minimize the input of mercury in waste incineration plants, significant amounts of mercury can occasionally get in via the waste bunker into the combustion and thus into the flue gas and potentially vary the level of mercury emissions. "	Accepted
Canada	Waste 6.1 4th paragraph	1st sentence: replace end of sentence with "…quickly initiated as needed."	Accepted
Canada	Waste 6.1 7th paragraph	Awkward phrasing. Basically this is saying that when emission limits are exceeded, the facility operator should check its monitoring operations/systems, input controls and other measures to determine the cause in order to make corrective action.	Edited to clarify

Canada	Waste 6.1 8th paragraph	Replace with "~~To determine elevated mercury concentrations in raw gas~~ CEMs are sometimes used to sample the particulate laden gas stream before a particulate control device (see 3.3)~~. That gives the possibility to react immediately~~, in order to determine elevated mercury concentrations in raw gas and take quick corrective action as needed e.g. inject AC or halogenated compounds.	Accepted
Canada	Waste 6.2 1st paragraph	Replace with " Mass balances are extremely difficult to apply due to potential high ~~Hg~~ mercury variations in waste input and great difficulties to reliably monitor ~~Hg~~ mercury levels in heterogeneous waste."	Accepted
Canada	Waste 6.2 3rd paragraph	Replace with " For monitoring purposes, emission factors should not be used ~~in~~ for determining mercury emissions from waste incineration plants. ~~This is~~ The use of emission factors gives estimates that may not be accurate due to the mercury content variation in waste.	Accepted
Canada	Waste 6.3 2nd paragraph	Add "which include : " to the end of the chapeau.	Accepted
Canada	Waste 6.3 2nd paragraph	3rd Bullet point : replace "illégal" with "improper "	Accepted
Canada	Waste 6.3 7th paragraph	Please provide explanation of why detection of high mercury levels in the flue gas is commonly not possible with discontinuous measurement methods and no counter measure can be initiated.	Edited to clarify
ZMWG	Waste incineration facilities - BEP	Describe behavior under abnormal operating conditions such as a fire in the waste bunker or other accidents or incidents.	Accepted – additional text included
China	Waste (General)	Suggest including information on waste sorting techniques (esp. for medical waste) to not only focus on waste incineration.	Already covered in 5.6.1.1
China	Waste (General)	Suggest including additional waste incineration technique in the guidance (details to be submitted by the Chinese experts).	The information could not be included as it was not provided.
United States	Waste incineration - references	Check – some in text are not included in the reference section i.e. from section 3.6.3 Skinner et al 2007, deVries et al 2007. Other reference appear incomplete and a reader would be unable to find them e.g. Pless Mulloli, Edwards et al. 2001	Noted – and corrected

Cement			
CREPD	Cement	There should be a clear and common understanding of the difference between mercury emissions/releases from cement kilns that burn waste (co-incinerate waste) and cement kilns which do not burn wastes. So far this is not clear from the proposed document. You can also highlight the importance of content of mercury in sewage sludge which is not enough carefully mentioned in that section	No update to text. The document does not have to make the distinction the commenter is seeking because the same control techniques for mercury air emissions will have to be used if burning either waste materials or regular fuels. No update to text. The document already includes a discussion of the importance of selecting input materials into the process to minimize mercury air emissions.
Cement Industry Federation	General	Given low levels of mercury associated with the cement industry in Australia, cement manufacturers in Australia should be excluded from any national plans to reduce emissions	Comment acknowledged. No change to the text necessary.
ZMWG	Cement Clinker Production facilities – introduction	This should indicate that mercury in fuel and feedstock will end up in the environment. Techniques to use low or no mercury fuels, and avoid addition of mercury-containing wastes/fuels and additives are critical, and should be more prominently included. Testing mercury levels entering the process is another key element. Sourcing limestone with low mercury levels may be effective. The use of natural gas as fuel where feasible should be considered.	No update to text. The document already includes a discussion of the importance of selecting input materials into the process to minimize mercury air emissions.
CEMBUREAU, Hellenic Cement Industry and CSI	Cement clinker control costs	Discrepancies in the cost of installing abatement equipment (e.g. bag filter and sorbent injection). Investment cost for a baghouse is listed as $50k-100k without reference; in §3.2.3 the costs for a baghouse is listed as $3.2m (2005) referencing US Cement 2010 which does not state this number; the only published cost in the industry for sorbent injection followed by a bag filter is Ash Grove Cement Durkee whose published cost is $20M 4	No update to text. The costs included in 3.2.2 are those for the purchase and installation of a sorbent injection system, not including the cost for a dust filter as these are already in use at cement plants. Text updated. In order to address the comment, we have added information on the cost for a dust filter system in the EU. In addition, the cost included in the document was calculated to represent the cost of installing commercially available technology at a plant in the US. The reference included for the paragraph is the cost impact analysis for the final US rule for Portland cement manufacturing. With regards to the published cost of 20M USD for the Ash Grove Cement Durkee plant, these include costs that would not be included at a facility wanting to install such a technology in the future.
Titan America	Cement clinker control costs	There should be no mandated pollution control technologies or methodologies for mercury emission	No update to text. This is what the document intends to do and does.

		reduction. The standards should be related to achievable emission levels and the technology or methodologies for achieving these standards should be determined by the subject facilities on a case-by-case basis. The costs for any particular technology and methodology will vary greatly and the cost information in the draft BAT/BEP document should be considered relative. For cost information in the draft BAT/BEP document to be meaningful consideration should be given to updating costs and normalizing all costs to the current year. For example, our recent experience with bag filters indicates that costs for a bag filter at a 1.2M mt per year facility would be $5-6 million per filter. The Draft BAT/BEP also did not include cost estimates for dust shuttling systems which based on our recent experience indicates costs of $0.5 to 1.5 million, depending on what equipment is necessary	No update to text. See response to the previous comment. Text updated. The cost numbers provided by the commenter were not used as they were not referenced, however text has been added to clarify that for facilities not applying dust shuttling, investments in additional dust transport system, storage silo and dosing equipment to the cement mill are required.
NRDC	Cement Clinker production, section 2.2.2, paragraph 1, last sentence	"Vertical shaft kilns are not described here as they show low energy efficiency and poor environmental performance " As they are still used in some countries, it should be specified that they cannot be considered BAT, otherwise there is no guidance as to their acceptability.	Text rearranged to clarify the points made by the commenter. For mercury air emissions control, there is not difference between the abatement techniques that could be used in a vertical shaft kiln as in others. For this reason, we are not specifying that they cannot be considered BAT regarding mercury air emissions control.
United States	Cement clinker production section 2.3.1	Last para in section 2.2.4.2 in waste incineration references additional discussion in cement chapter regarding use of waste in cement production. It should be clear in this section that 'alternative waste or fuel' or 'waste derived fuel' can include hazardous waste	Text updated. Text has been added to clarify that waste derived fuels can include hazardous waste.
NRDC	Cement Clinker production, section 2.3.1 paragraph 2, last sentence	Amend: "However, it should be noted that mercury contents can **be vary** significantly ~~higher than~~ **from what is** presented in Table 1." Note that mercury content could be lower as well as higher	Text updated to reflect this comment.
National Toxics Network	Cement clinker production – Table 1	Table 1 indicates very high levels of mercury in waste materials used as raw materials, while waste derived alternative fuels have a similar concentration to conventional fuels. It should be noted that a method to reduce mercury emissions is to avoid use of waste derived raw materials.	The text in the guidance document addresses the commenters concerns.
National Toxics Network	Cement clinker production – Table 1	Table 1 also lists municipal sludge as an alternative fuel with a maximum concentration of 2.5 ppm. It is not clear	The text in the guidance document addresses the commenters concerns.

		if this includes sewage sludge which has values between 5 and 16 ppm. This should be reflected in the table and a recommendation to avoid alternative fuels with a high mercury concentration included in the text.	
National Toxics Network	Cement clinker production – Figure 1	The text indicates that the use of alternative fuels and/or alternative raw materials will not necessarily increase (or decrease) mercury emissions. This should be amended to read: The use of alternative fuels and/or alternative raw materials may increase mercury emissions depending on the relative mercury content of such materials. Alternative raw materials have significantly higher mercury concentrations than natural raw materials. Some alternative fuels such as sewage sludge have been identified with much higher concentrations of mercury than other fuels (either conventional or alternative) and may result in higher mercury emission when combusted.	Comment not accepted as original text considered to be accurate.
NRDC	Cement Clinker production, section 2.3.2	The section describes concentrating effects well, however the potential for sudden, high mercury releases from Portland cement kilns during a transient should be discussed. Mercury analyser CEMS may give better data than sorbent trap CEMS as they give real time information. Reference supplied in submission	No update to text. Section 6.4.2 and 6.4.4. address the commenter's concerns. The Expert Group considered that a discussion on CEMS is appropriate in the section the commenter is referencing.
NRDC	Cement Clinker production, section 2.3.2 paragraph 2, sentence 3	Add "or kiln dust (if it is discarded)" to the end of the sentence	No update to text. The sentence as it reads addresses the commenter's concerns.
Norway	Cement, 3	Current Norwegian cement clinker facilities use the described technologies and had average Hg emissions of 2 to 7µg/Nm3 in 2014.	No update to text. The information has been noted but not included in the text due to lack of specifics.
ZMWG	Cement Clinker production Facilities – section3	Clarify which techniques are BAT and which are BEP. It is important also to mention achievable emission levels associated with BAT Each country should also be encouraged to adopt limit values for inputs, with an adequate monitoring plan.	No update to text. It is the opinion of the Expert Group that a sharp distinction between BAT and BEP does not benefit this guidance due to their close links in the context of cement clinker production. No update to text. The text already addresses the commenters concerns in section 3.1.1.
NRDC	Cement Clinker Production, section 3.1	Revise title **"Primary measures to control mercury emissions"**	Title of section 3 updated to reflect this comment.
National Toxics Network	Cement clinker production – section 3.1.1	The statement that 'in cases where alternative raw materials lead to a significant increase in mercury intake they may have to be replaced by another alternative material' obscures the conclusion that alternative raw	The text in the guidance document addresses the commenter's concerns.

		materials are higher in mercury than natural raw materials and should be avoided to reduce mercury emissions. The guidance should make a distinction between the categories of materials on the obvious mercury content difference and recommend against the use of materials known to have high mercury contents.	
ZMWG	Cement Clinker production Facilities – section 3.2	Distinction is made between secondary measures and multi-pollutant control measures. Sorbent injection is also a multi-pollutant control measure. Propose deletion of the heading 'multi-pollutant control measures and present all as secondary measures	No update to text. The multi-pollutant control measures are primarily aimed at non-mercury pollutants, but do also reduce mercury emissions. The secondary measures are primarily aimed at mercury air emission reductions, but could also control other air emissions.
United States	Cement Clinker production section 3.2.1	Include references for per cent reduction range under achieved environmental benefits	Text updated to include references.
United States	Cement Clinker production section 3.2.1	Second bullet under number 2 – should this be "bypass stream" rather than "bypass steam"	Text updated.
ZMWG	Cement Clinker production Facilities – 3.2.1	Dust shuttling should not be seen as a mercury control strategy. Shuttling is done for economic reasons, and reducing mercury emissions may require reducing or stopping the practice. Handling the mercury containing dust safely is necessary to avoid mercury entering the environment.	No update to text. The Expert Group does not agree with the commenter's assertions. Many cement kilns in the US and Germany currently use dust shuttling to effectively reduce mercury air emissions.
United States	Cement Clinker production section 3.2.2	Include references for per cent reduction range under achieved environmental benefits	Text updated. Due to the lack of a published reference this information was deleted.
United States	Cement Clinker production section 3.2.2	Is there a dollar year (or range of dollar years) associated with the costs included under the 'cost' heading	Text updated to address concern.
NRDC	Cement Clinker Production, section 3.2.3	Mercury-sorbent contact time is listed as a variable for the efficiency of mercury control, however if the sorbent is well mixed into the gas stream the mass transfer is fast. The biggest issue is dispersion in the gas stream.	No update to text. The text already contains this information.
NRDC	Cement Clinker Production, section 3.2.3, paragraph 4	Add : by **potentially limiting the sorbent injection rate. Therefore, the polishing baghouse must be adequately sized**	Text updated. Part of the text provided by the commenter was accepted in order to address the concerns.
NRDC	Cement Clinker Production, section 3.2.3, economic	Check statement of total capital costs for accuracy.	The reference is correct.
United States	Cement Clinker production section 3.3.1	Wet scrubber – under the 'cross media' heading it indicates these are effects that do not relate to mercury, however the second bullet in the list is mercury-related, noting that mercury is shifted to by-product production such as gypsum.	Text updated to address concerns

CEMBUREAU and Hellenic Cement Industry and CSI	Cement clinker -3.3.1 Wet scrubber controls	Mercury reduction in wet scrubbers at cement kilns may vary widely from case to case. The levels of up to 80% of mercury removal for a referenced set of plants are certainly not achieved by other plants with high elemental mercury (reportedly less than 20% mercury removal). Such results are usually not published though	Text updated to address the comment.
NRDC	Cement Clinker Production, section 3.3.2, first line	Format 'NH3' correctly	Editorial. Accepted.
NRDC	Cement Clinker Production, section 3.3.2, para 2, sentence 4	Amend : "On the other hand, Low Dust systems don't have problems with the high dust load **(much higher than the dust loading of a coal-fired plant)** before filter and thus allow much longer operation time of the catalyst."	Not accepted. Insertion would not add clarity.
NRDC	Cement Clinker Production, section 3.3.2 para 3, sentence 2	Amend : "This oxidized mercury ~~can then better be removed from the gas stream in a subsequent~~ **is more likely to be removed in downstream air pollution control devices, such as the** dust filter or wet scrubber."	Accepted.
NRDC	Cement Clinker Production, section 3.3.2, para 4 last sentence	Amend: "That means that it works in combination with High-Dust-SCR, but not with Tail-End-(Low Dust-) SCR **unless the low dust SCR is followed by a scrubber."**	Not accepted. For technical reasons, this mercury control configuration would not be used in practice.
NRDC	Cement Clinker Production, section 3.3.2, Operational Experience	Amend last sentence: "Quantification of the mercury oxidizing effect **in Portland cement kiln applications** requires further investigation."	Accepted in a modified version to address the concern.
NRDC	Cement Clinker Production, section 3.3.2, Applicability	Amend: "The mercury oxidizing side effect can be achieved only in cement plants ~~which are equipped with the High-Dust-SCR technique~~ **where the dust filter or a scrubber are downstream of the SCR.**"	Comment modified but accepted.
CEMBUREAU	3.3.2 SCR technology	Extensive research is currently carried out to proof the applicability of Selective Catalytic Reduction (SCR) technology in the cement industry. The high dust levels impose high demands on the durability and the operation	Comment noted. This information is already included in the text. No changes required.

		of the catalysts and the design and chemical composition of the catalysts are very important, thus the various types of catalysts for SCR being used in the cement industry are still under development	
Cement Industry Federation	Cement clinker – wet scrubber	References to the benefits of mercury removal using wet scrubbers are queried. Report's from CIF members are that wet scrubbers are very expensive, very 'messy' and difficult to manage, with questionable efficiency	This technique has been included due to co-benefits of mercury removal.
ZMWG	Cement Clinker production Facilities – 3.3.3, first paragraph	"NH4 compounds, HCl, HF" should be deleted as these compounds are not reduced by activated carbon filters. Under "achieved environmental benefits" is should be mentioned that levels below 0.005 mg/Nm3 are usually achieved when applying the filter.	Not accepted, as the Expert Group considered the text is correct. Suggested value was not included due to lack of references.
United States	Cement Clinker production section 4.1	Mercury roaster – an explanation of what happens to condensed mercury would be useful to help consideration of potential cross media effects	Emerging techniques section was removed from document due to a lack of information.
China	Cement, 4.2 and 4.3	Note that content is missing under these headings.	See comment above.
Canada	Cement, 5	*"The performance level associated with best available techniques and best environmental practices in new and existing installations for control of mercury emissions to air is below 0.03 mg Hg/Nm3 as **a daily average**, or average over the sampling period, at reference conditions 273 K, 101,3 kPa, 10 per cent oxygen and dry gas."* For 0.03mg Hg/Nm3, the reference period should be longer; either monthly or annual. Even efficient plants may have days where emissions exceed this value.	Text amended to address the commenter's concern.
CEMBUREAU	Section 5	A longer timeframe (e.g. 30 days) for determining BAT/BEP is appropriate, rather than a daily average. The justification for the 0.03 mg Hg/Nm3 the associated level of BAT is based on emissions from a sub-set of plants that can achieve this low emission level due to their raw materials rather than a specific abatement technique.	Text amended to address the commenter's concern.
Cement Industry Federation	Cement clinker, section 5 para 2 and 3	the time period associated with BAT/BEP at a level of 0.03 should be a monthly or 30-day rolling average - data used is from Europe with testing done under normal operating conditions (with the mill running). The authors have used the data out of context to justify an overly restrictive level of performance. . It is quite conceivable that plants that average less than 0.013 mg Hg/Nm3 on a monthly basis (approximate USA Neshap limit, the most	The text has been amended to address the commenter's concerns.

		restrictive regulation world-wide) will at times exceed the 0.03 mg Hg/Nm3 if measured on a daily average.	
Hellenic cement industry and CSI and Titan America	Cement clinker, section 5 para 2 and 3	the time period associated with BAT/BEP at a level of 0.03 should be a monthly or 30-day rolling average - data used is from Europe with testing done under normal operating conditions (with the mill running). The authors have used the data out of context to justify an overly restrictive level of performance. . It is quite conceivable that plants that average less than 0.013 mg Hg/Nm3 on a monthly basis (approximate USA Neshap limit, the most restrictive regulation world-wide) will at times exceed the 0.03 mg Hg/Nm3 if measured on a daily average.	Text amended to address the commenter's concern.
Portland Cement Industry	Cement clinker, section 5 para 2 and 3	Thirty-day (30-day) rolling average should be adopted as the standard averaging period for any mercury emissions limit to account for process variations for times when the raw mill is operating and when it is not operating. Rolling average means the average of all data that meet QA/QC requirements or are otherwise normalized. The data must be collected during the applicable averaging period.	Text amended to address the commenter's concern.
Hellenic cement industry and CSI	Cement clinker emissions levels	The data for the level of 0.03 mg Hg/Nm is from US and Europe and there is little evidence that this is achievable in other areas of the world such as Latin America or parts of Asia where historical volcanic activity has left the raw materials with higher levels of mercury	The Expert Group disagree with this comment. Data from Asia and Latin America are included in the reference materials. Moreover, the amended text addresses the commenter's concern.
Japan Cement Industry	Cement clinker emissions levels	Level of 0.03 mg Hg/Nm - limited actual example on relations between achieved reduction rates and emission concentrations is described only in Chapter 3.2.2 "Dust shuttling with sorbent injection" in the draft. We have to keep in mind and consider various local, geological mercury conditions of raw materials and fuels as well as regional feasibility of treatment/disposal of captured mercury. We do not think that the 0.03 mg/Nm3 emissions level would be justified as an achievable level for all the cement plants in the world. Furthermore, the report of Mercury in the Cement Industry (Renzoni et al., 2010) does not describe any performance level associated with BAT/BEP but just an objective emission report based on global survey from cement plants at that time. Performance levels are not described in other chapters. Propose deletion of these paragraphs.	Text amended to address the commenter's concern.

Zlatna Panega Working Group	ELV	BAT associated performance level of 0,03 mg Hg/Nm3 as average daily value or as a value over the sampling period is not representative and easily could be exceeded even from installation which usually have low Hg emissions – once because of the variation in raw materials and fuels and also because of the different kiln working modes and conditions. These situation could be avoided taking longer average period for reporting of Hg emissions. Additionally the current ELV according to the European legislation is 0,05 mg Hg/Nm3. Should be decided on a country basis. Could result in large investment without assured results	Text amended to address the commenter's concern.
Cement Industry Federation	Cement clinker – Emission Limit value	The inclusion of an ELV in the cement guidance while it is not included in guidance documents for other technologies is queried. The determination of recommended ELVs should be left up to each member state to decide based on their own specific circumstances.	The value included is an indicative performance value and not an ELV. It is agreed that it will be up to the parties to establish any ELVs.
Cement Industry Federation	Cement clinker emission levels	Levels of 0.03 mg Hg/Nm3 is derived from a small selection of US and European plants. There is no evidence that this is achievable elsewhere. Achieving levels below this is extremely unlikely.	Comment not accepted based on the information in the reference used for that section.
Cement Industry Federation	Cement clinker emission control costs	Costs in document of $50,000 to $3.2m are much lower than those seen generally, which in Australia are in the order of tens of millions of dollars	This comment has partially been addressed by amending the text. No reference for the costs in Australia has been provided.
NRDC	Cement Clinker Production, section 5, para 3	A distinction should be made for new versus existing facilities. New facilities generally have more stringent limits applied than existing, with new technology being able to be included at the design phase. Reference supplied in submission	Not accepted. The techniques discussed in this guidance document would be applicable to both new and existing sources and it would be up to the parties to determine what is BATBEP.
United States	Cement Clinker production section 5.2	Secondary measures – final sentence references that use of additives such as bromine can increase mercury removal efficiency. Potential cross media impacts of the use of these halogens should be included (see page 22 of coal which references this)	Addressed in general halogen issues.
NRDC	Cement Clinker Production, section 5.2, first sentence	Amend: "There are a number of secondary measures that should be considered ~~as appropriate~~ **and utilized as needed."**	Not accepted. Its inclusion does not provide additional clarity.<
CEMBUREAU and Hellenic Cement Industry and	Cement clinker Section 6 -Monitoring	Especially less industrialized countries may be lacking in the required technological support by the (mostly European or US) analyzer suppliers and the necessary specific expertise in the cement industry on continuous	Comment acknowledged. The mass balance approach is already discussed in the guidance document.

CSI		emission monitoring. Therefore mass balance is the more appropriate approach in those countries	
Titan America	CEMs	Current issues the U.S. cement industry has experienced with mercury CEMS. Certification of mercury CEMS to U.S. Performance Specification PS-12A and span/calibration requirements in the NESHAP regulation have been very difficult to achieve.	Comment acknowledged.
Zlatna Panega Working Group		Monitoring of Hg emissions required on a yearly basis gives two options – continuous measurement on the stacks or mass balance method. As continuous monitoring analyzers are usually expensive and require huge efforts regarding maintenance and operational control it would be most appropriate usage of mass balance approach	Comment acknowledged. The mass balance approach is already discussed in the guidance document.
ZMWG	Cement Clinker production Facilities – section 6	This section does not reflect BAT and needs significant improvement	The document does not present BAT for monitoring.
Cement Industry Federation	Cement clinker – monitoring	CIF members question the role, availability, application and reliability of CEMS versus using mass balance approach and slack testing. They report CEMS as being very expensive and difficult to manage with concerns on reliability.	Guidance has been provided on multiple methods of monitoring, including the ones mentioned in the comment.
ZMWG	Cement Clinker production Facilities – section 6.1	Add at the end of the second paragraph "Emissions measurements can be used both for providing the proof that the emission limit value is met and to use the measurement signal for operating the control devices such as the dosage of sorbent injection" This text indicates the possibility of minimizing mercury emissions by the use of control techniques.	Not accepted. It does not add clarity to the guidance.
NRDC	Cement Clinker Production, section 6.1, para 2	Amend: The ~~objective of an~~ **anticipated** emissions reporting scheme **under the Convention** has an important impact on the type of monitoring chosen for a certain installation. ~~Therefore testing~~ **BEP compliance will require testing** and monitoring ~~comprise the material balance method (based on input sampling and analyses) and/or~~ **based on** emission measurements (output) at the stack, **absent extrordinary circumstances**." Remove consideration of materials balance from BEP except under extraordinary circumstances.	Not accepted. The comment does not provide clarity.

ZMWG	Cement clinker – section 6.3	After the first sentence of the second chapter add the follow text: **(see Chapter 7.1)**	Not accepted. The mass balance technique, when conducted appropriately, is a viable alternative in the absence of other emission monitoring techniques.
ZMWG	Cement Clinker production Facilities – section 6.4.1	This section should be deleted as it is practically impossible to reliably determine emissions of mercury by mass balances. The quantities of mercury in input materials is low, and is very uncertain, so the estimation of mercury is not reliable.	Not accepted. The mass balance technique, when conducted appropriately, is a viable alternative in the absence of other emission monitoring techniques.
Waltisberg Consulting	Cement, 6.4.1	Propose removing this from the document as it is only indicative and cannot be used as a measuring method.	Not accepted. The mass balance technique, when conducted appropriately, is a viable alternative in the absence of other emission monitoring techniques.
NRDC	Cement Clinker Production, section 6.4.1	Materials or mass balance should not be BEP given challenges in doing it accurately, although it may help in conjunction with spot sampling. Measurement (particularly continuous measurement) is much preferred.	Not accepted. The mass balance technique, when conducted appropriately, is a viable alternative in the absence of other emission monitoring techniques.
ZMWG	Cement Clinker production Facilities – section 6.4.2	The manual methods are commonly used as reference methods. The term 'impinger methods' should be replace by 'reference methods'.	Not accepted. The term "reference methods" is used in a broader context in this document.
NRDC	Cement Clinker Production, section 6.4.2, disadvantages	Is method accurate enough when emission levels are set consistent with BAT? If not, this should not be BEP.	Yes, spot measurements are accurate enough for emission levels consistent with BAT.
NRDC	Cement Clinker Production, section 6.4.2, para 1, sentence 2.	Amend : In a few developed countries (Germany, U.S.) regulations are changing requirements from spot stack sampling to continuous sampling and analysis (**analyzer or sorbent trap** CEMS ~~or Sorbent Trap System~~) in order to provide for a better characterization of emissions.	Comment accepted.
NRDC	Cement Clinker Production, section 6.4.3.	Delete entire section. 'Semi-continuos' is confusing, and is misused in this section	Text amended to address the concern.
ZMWG	Cement Clinker production Facilities – section 6.4.4	After the last sentence of para 2, add the following: ""Today, monitors are available which are highly reliable requiring a reasonably low level of maintenance"	Not accepted. There is no reference for this statement.
ZMWG	Cement Clinker production Facilities – section 6.4.4	The last part of the sentence under disadvantages which is "requires calibration for both raw mill on and raw mill off operation because mercury levels typically go beyond the calibrated mill on span during mill off operation" should be deleted as it does not reflect existing situations. A continuous monitor is usually calibrated for the whole range of values including mill on and mill off operating modes.	Not accepted. The guidance text is correct.

NRDC	Cement Clinker Production, section 6.4.4 .	In the US sorbent traps are allowed for CEMS, so should not be distinguished.	Not accepted. We are making a distinction between the techniques, as they are both applicable.
Waltisberg Consulting	Cement, 6.4.5	Proposed new section on Semi-continuous (Sorbent trap method) vs. continuous monitoring system (mercury CEMS)	Text updated to address the comment.
Canada	Cement, 7.1	"…Consequently, they are volatised in the preheater and ~~leave it~~ **remain** in the gas phase. These ~~physic~~ **physico**-chemical properties…"	Accepted.
ZMWG	Cement clinker – section 6.3	After the first sentence of the second chapter, add the following text: **(see Chapter 7.1)**	Accepted

Non-ferrous			
United States	Non-ferrous metal chapter, general	Page numbers would be useful	Addressed
China	Non-ferrous	Suggest listing additional Hg control technique (to be submitted by Chinese experts)	Material was provided by the Chinese member of the Expert Group. The group agreed that the material provided was unlikely to reflect operation at a fullscale smelter or roaster and hence was not included
Freeport McMoran	Non-ferrous, 1	*"In secondary smelting, there are no mercury-specific control technologies. ~~In fact, secondary smelting may be more of a concern for dioxins and furans.~~ Thus, secondary smelting is not addressed in this guidance."*	Text modified to address comment
NRDC	Non-ferrous – section 1, sentence one	Delete 'trace' – is up to 200ppm really 'trace'	The intention is not to suggest that mercury cannot exist at higher levels than trace
NRDC	Non-ferrous – section 1, paragraph 5, sentence one	Statement relating to secondary metal smelting being a negligible source of mercury emissions is incorrect. Secondary steel mills are one of the most significant sources of Hg emissions in the USA and other developed countries due to mercury switches in automobiles and appliances sent to steel mills as scrap feed.	This guidance focuses on non ferrous sector. The text on secondary smelting has also been modified
Freeport McMoran	Non-ferrous, 2	*"However elemental mercury passes all such standard **dry and water only** gas cleaning equipment."*	This addition is redundant
Freeport McMoran	Non-ferrous, 2	*"The sludge containing mercury should be **recycled or** disposed of in an environmentally sound manner."*	Text amended to accurately reflect convention
NRDC	Non-ferrous – section 2, paragraph 6	Amend sentence 2: This guidance does not address the management of these materials but **under Articles 3 and 10 of the Convention the storage and trade of calomel, other mercury compounds, and mercury derived from these compounds are regulated. Moreover, under** Article 11 of the Convention **their disposal must be performed in** ~~they should be stored or disposed of~~ an environmentally sound manner as waste	Text amended to accurately reflect convention
Canada	Non-ferrous, 2.2.1	The statement *"... each zinc refinery will purchase zinc concentrates from several different mines. The mercury content from an individual mine can vary between 1 and 200 ppm"* is not quite correct. Suggest rephrasing the latter sentence as follows:	Text modified to address comment

		"The mercury content of a typical zinc mine concentrate will vary between 1 and 200 ppm but may range as high as 1,000 ppm."	
Rio Tinto	Non-ferrous, 2.3.1	Propose adjustment of language in first para: change "…outlet temperature ranging from 100 - 200C" to "…outlet temperature range of 100-200C"	Addressed
Freeport McMoran	Non-ferrous, 2.3.4	*"A by-product of this process is the production of converter slag,which is reprocessed to recover copper in a slag cleaning furnace or returned to* ***the*** *smelting* ***furnace****."*	Addressed
Freeport McMoran	Non-ferrous, 2.3.5	*"Blister copper is then refined in anode furnaces, mainly to eliminate oxygen****, sulfur*** *and any* ***trace*** *contaminants."*	Addressed
Freeport McMoran	Non-ferrous, 2.3.7	*"Mercury-containing residues and sludges resulting from gas cleaning or mercury removal processes should be* ***treated and recycled or*** *disposed of in an environmentally sound manner."*	Text amended to accurately reflect convention regarding management.
NRDC	Non-ferrous – section 3, paragraph 1, last sentence	Delete 'also', add 'separately' at the end of the sentence.	No change considered necessary
United States	Non-ferrous metal chapter, section 3.1.5	Cross media effects – suggest deleting "Impacts on air and water due to the production of solid calomel waste, by leaching or vaporization of mercury. Calomel waste needs to be stabilized before environmentally sound disposal (e.g. in underground salt mines)." There are various ways for ESM of calomel waste, salt mines should not be singled out.	The expert group believes that the cross media impact of calomel waste is potentially significant and should be retained. The second sentence has been deleted.
United States	Non-ferrous metal chapter section 3.1.5	In the second bullet on risks to workers health, add more discussion to clarify link with cross-media impacts	Deleted here as not really cross media impact but added to process description
Canada	Non-ferrous, 3.2.1	*"Mercury can be recovered by mixing the solids with calcium oxide, and then heating to distil away the mercury which can then be ~~deal~~* ***dealt*** *with in accordance with the Convention"*	Addressed
Freeport McMoran	Non-ferrous, 3.2.1	*"Mercury can be recovered by mixing the solids with calcium oxide, and then heating to distil away the mercury which can then be deal****t*** *with in accordance with the Convention."*	Addressed
Freeport McMoran	Non-ferrous, 3.2.1	*"Alternately****,*** *mercury may be precipitated and the mercury sludge removed from the cooled acid, filtered and washed."*	No change considered necessary

Freeport McMoran	Non-ferrous, 3.2.1	*"The waste needs to be stabilized before environmentally sound* ***recycling or*** *disposal."*	Text amended to accurately reflect convention regarding management.
United States	Non-ferrous metal chapter, 3.4	Activated carbon - References?	Descriptions are based on extensive industry input; there are not easily accessible references in the peer reviewed literature but some have been provided to address comment.
United States	Non-ferrous metal chapter, 3.4.6	Cross media impacts – there should be no prescriptive statement of how to dispose of potential waste, this should be done according to national policies	The statement has been modified
Rio Tinto	Non-ferrous, 3.4.6	Comment suggests that there is a market for elemental mercury recovered from spend activated carbon filter. This may imply that the document could mention that this mercury could re-enter the market.	Text amended to accurately reflect convention regarding management.
United States	Non-ferrous metal chapter, 3.5	Dowa filter process - References?	See above comment on references, however some have now been provided
Freeport McMoran	Non-ferrous, 3.6.1.2	*"Both wet and dry electrostatic precipitators (ESPs) are widely used in the non-ferrous metals sector as a primary* ***or secondary*** *stage of particulate matter removal."*	Test modified
Freeport McMoran	Non-ferrous, 3.6.1.3	*"The effluent can be reused in the scrubber, while the sludge can be* *recycled in the smelting process****, treated and recycled off-site*** *or disposed of."* Suggest inclusion of text stating that appropriate disposal of this material should be considered when the other options are not feasible	Text amended to accurately reflect convention regarding management.
Freeport McMoran	Non-ferrous, 3.6.1.3	*"However, wet scrubbers are not very effective in removing gaseous elemental mercury* *from gas streams, unless it contains selenium compounds* ***or dilute sulfuric acid****."*	The Expert Group is not aware of any evidence that dilute sulfuric acid is effective. Text has been modified to clarify
Freeport McMoran	Non-ferrous, 3.6.2.4	To end of first para, suggest adding text stating that additional CAPEX could be needed to meet sulfuric acid Hg specifications.	Mercury in acid is beyond scope of this guidance
Freeport McMoran	Non-ferrous, 3.6.2.6	*"This mercury waste should undergo environmentally sound* ***treatment and recycling or*** *disposal."*	Text amended to accurately reflect convention
United States	Non-ferrous metal chapter, 4.2	Jerritt process - References?	See comments above

United States	Non-ferrous metal chapter, 4.2.4	Cross media impacts – second bullet on risks to workers health, add more discussion to clarify link with cross-media impacts	Deleted and added to process description
United States	Non-ferrous metal chapter, section 5	It is not clear why a process such as Jerritt which has been installed and operating for several years would not be considered a BAT.	Jerritt process re-located to BAT descriptions.
Norway	Non-ferrous, 5.1 (Table 4)	Suggest inclusion of a new column with information on the cost related to each Hg control technique	Costing is site specific and time dependent and it was agreed that it should not be included
Rio Tinto	Non-ferrous, 5.1 (Table 4 – Activated carbon filter beds)	Under "Disadvantages", propose text changes indicating that spent carbon can only be disposed of in landfills after mercury removal and classification as non-hazardous material, otherwise a hazardous waste disposal facility should be used.	Text amended to accurately reflect convention regarding management.
NRDC	Non-ferrous, section 5.1, table 4, columns 4 and 5, row 2	As the technique is stated to be unsure if currently in use, and not widely used, should this appear in the table as it may not be 'available'.-	This technique moved to "other" processes and removed from table. Text modified in response
NRDC	Non-ferrous, section 5.1.1, final sentence	Add the following : **Regardless of the method chosen, all of the technologies are capable of mercury reduction in excess of 90% in the flue gas, including the co-benefit gas cleaning/sulfuric acid plant combination. These options are globally available and pose no extraordinary technology or operational challenges. Therefore, BAT options chosen by Parties should achieve comparable levels of performance, particularly for new or large facilities."** Note that this is needed to provide clarity regarding the level of performance found by the expert group to be BAT :	Not required because issues already covered in the introduction to the guidance
Freeport McMoran	Non-ferrous, 5.2.5	*"Safe storage and transport of mercury* ***containing co-products and*** *wastes resulting from air pollution controls (e.g., liquid elemental mercury recovered…"*	Added by-products
Freeport McMoran	Non-ferrous, 5.2.5	*"Environmentally sound* ***treatment and recycling or*** *disposal of mercury wastes."*	Text amended to accurately reflect convention regarding management.
NRDC	Non-ferrous, section 5.2.5	Revise second bullet to read : • **Trade in mercury and mercury compounds in compliance with Article 3 of the Convention."** Revisions are needed to be consistent with the Convention	Text amended to accurately reflect convention regarding management.

NRDC	Non-ferrous, section 6	"Considerations for Determining BEP Monitoring" Comment regarding above text: A summary paragraph is required here indicating which options would typically be considered BEP, and which would not be considered BEP, absent extraordinary circumstances.	Group did not agree that monitoring options should be considered as BEP
Freeport McMoran	Non-ferrous, 6.1 (Continuous emissions monitoring systems (CEMS))	*"In comparison, many non-ferrous smelting facilities emit more chemically complex exhaust gases with lower flowrates and* ***potentially*** *higher levels of mercury concentration in more complex gas streams."*	Addressed

UNITED NATIONS

EP

UNEP(DTIE)/Hg/INC.7/INF/2

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United Nations Environment Programme

Intergovernmental negotiating committee to prepare a global legally binding instrument on mercury
Seventh session
Dead Sea, Jordan, 10–15 March 2016
Item 3 (b) of the provisional agenda*

Work to prepare for the entry into force of the Minamata Convention on Mercury and for the first meeting of the Conference of the Parties to the Convention: matters required by the Convention to be decided upon by the Conference of the Parties at its first meeting

Available information that might assist the committee's work

Note by the secretariat

1. In its decision 25/5 on chemicals management, including mercury, the Governing Council of the United Nations Environment Programme (UNEP) requested the Executive Director of UNEP to convene an intergovernmental negotiating committee with the mandate to prepare a global legally binding instrument on mercury. At its fifth session, the intergovernmental negotiating committee agreed on the text of a global legally binding instrument, the Minamata Convention on Mercury, which was adopted and opened for signature at the Conference of Plenipotentiaries held in Kumamoto, Japan, on 10 and 11 October 2013. In paragraph 3 of its resolution on arrangements in the interim period (UNEP(DTIE)/Hg/CONF/4, annex I), the Conference of Plenipotentiaries invited the Executive Director of UNEP to convene such further meetings of the intergovernmental negotiating committee during the period between the date on which the Convention was opened for signature and the date of the opening of the first meeting of the Conference of the Parties to the Convention as may be necessary to facilitate the rapid entry into force of the Convention and its effective implementation upon its entry into force.

2. At its seventh session, the intergovernmental negotiating committee will have before it a number of working and information documents prepared at the request of the committee at its previous sessions. The secretariat is also making available to the committee a number of background documents prepared in response to previous decisions of the Governing Council and requests by the ad hoc open-ended working group to prepare for the intergovernmental negotiating committee on mercury and by the earlier Ad Hoc Open-ended Working Group on Mercury. The background documents include reports, toolkits and guidance documents on topics relevant to the provisions of the Minamata Convention.

3. With a view to assisting Governments in their preparations for the seventh session of the intergovernmental negotiating committee, the documents for the session are listed in tables 1 and 2 below (see annex). Table 1 lists general reference documents and table 2 identifies other working, information and background documents that relate more specifically to individual articles of the Minamata Convention. Each background document is identified by a capital letter which matches that

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* UNEP(DTIE)/Hg/INC.7/1.

used to identify the document as it appears in the appendix to the annex. A brief description of each background document listed is also provided in the appendix.

4. The present note and the annex thereto update and expand the information contained in documents UNEP(DTIE)/Hg/INC.1/INF/6, UNEP(DTIE)/Hg/INC.2/INF/4, UNEP(DTIE)/Hg/INC.3/INF/2, UNEP(DTIE)/Hg/INC.4/INF/2, UNEP(DTIE)/Hg/INC.5/INF/2 and UNEP(DTIE)/Hg/INC.6/INF/1, which were made available to the committee at its first, second, third, fourth, fifth and sixth sessions, respectively. The annex is presented without formal editing.

Annex

Table 1

Working documents for the seventh session of the intergovernmental negotiating committee

Symbol	*Title*
UNEP(DTIE)/Hg/INC.7/1	Provisional agenda
UNEP(DTIE)/Hg/INC.7/1/Add.1	Annotations to the provisional agenda
UNEP(DTIE)/Hg/INC.7/2	Scenario note for the seventh session of the intergovernmental negotiating committee to prepare a global legally binding instrument on mercury
UNEP(DTIE)/Hg/INC.7/3	Draft guidance to assist parties in completing the forms required under Article 3
UNEP(DTIE)/Hg/INC.7/4	Draft guidance on identification of individual stocks of mercury or mercury compounds exceeding 50 metric tons, as well as sources of mercury supply generating stocks exceeding 10 metric tonnes per year
UNEP(DTIE)/Hg/INC.7/5	Compilation of submissions on the question of whether additional guidance was necessary in accordance with paragraph 12 of article 3 of the Minamata Convention
UNEP(DTIE)/Hg/INC.7/6	Report of the group of technical experts on the development of guidance required under article 8 of the Convention
UNEP(DTIE)/Hg/INC.7/6/Add1	Draft guidance on best available techniques and best environmental practices
UNEP(DTIE)/Hg/INC.7/6/Add2	Draft guidance on support for parties in implementing the measures set out in paragraph 5 of article 8, in particular in determining goals and in setting emission limit values
UNEP(DTIE)/Hg/INC.7/6/Add3	Draft guidance on criteria that parties may develop pursuant to paragraph 2 (b) of article 8
UNEP(DTIE)/Hg/INC.7/6/Add4	Draft guidance on preparing inventories of emissions
UNEP(DTIE)/Hg/INC.7/7	Draft memorandum of understanding between the Conference of the Parties of the Minamata Convention on Mercury and the Council of the Global Environment Facility
UNEP(DTIE)/Hg/INC.7/8	Draft guidance to the Global Environment Facility on overall strategies, policies, programme priorities, eligibility for access to and utilization of financial resources and on an indicative list of categories of activities that could receive support from the Global Environment Facility Trust Fund
UNEP(DTIE)/Hg/INC.7/9	Report by the co-chairs of the ad hoc working group of experts on financing established at the sixth session of the intergovernmental negotiating committee
UNEP(DTIE)/Hg/INC.7/10	Draft reporting format as amended by the intergovernmental negotiating committee on mercury at its sixth session
UNEP(DTIE)/Hg/INC.7/11/	Compilation of information on the frequency of reporting under other multilateral environmental agreements, including the Basel, Rotterdam and Stockholm conventions, along with available data on the submission of reporting rates under other agreements
UNEP(DTIE)/Hg/INC.7/12	Compilation and analysis of the means of obtaining monitoring data in relation to effectiveness evaluation
UNEP(DTIE)/Hg/INC.7/13	Draft rules of procedure for the Conference of the Parties to the Minamata Convention on Mercury
UNEP(DTIE)/Hg/INC.7/14	Draft financial rules for the Conference of the Parties to the Minamata Convention on Mercury
UNEP(DTIE)/Hg/INC.7/15	Report on proposals on how the Executive Director of the United Nations Environment Programme will perform the functions of the permanent secretariat for the Minamata Convention on Mercury
UNEP(DTIE)/Hg/INC.7/16	Analysis of offers to host the permanent secretariat of the Minamata Convention on Mercury
UNEP(DTIE)/Hg/INC.7/17	Draft guidance on developing a national action plan to reduce and, where feasible, eliminate mercury use in artisanal and small-scale gold mining

Symbol	*Title*
UNEP(DTIE)/Hg/INC.7/18	Environmentally sound interim storage: compilation and summary of submissions; identification of relevant sections of the Basel guidance; and a roadmap for work on interim guidance.
UNEP(DTIE)/Hg/INC.7/19	Compilation of information on the use of mercury waste thresholds
UNEP(DTIE)/Hg/INC.7/20	Guidance on managing contaminated sites and the proposed way forward for developing guidance
UNEP(DTIE)/Hg/INC.7/21	Progress report on the work of the interim secretariat in the period since the sixth session of the intergovernmental negotiating committee to prepare a global legally binding instrument on mercury
UNEP(DTIE)/Hg/INC.7/INF/1	Comments received on Best Available Techniques and Best Environmental Practices guidance documents during the public comment period
UNEP(DTIE)/Hg/INC.7/INF/2	Available information that might assist the committee's work
UNEP(DTIE)/Hg/INC.7/INF/3	Progress report on the UNEP Global Mercury Partnership
UNEP(DTIE)/Hg/INC.7/INF/4	Report on activities undertaken by partner organizations
UNEP(DTIE)/Hg/INC.7/INF/5	Offer to host the permanent secretariat from the Government of Switzerland
UNEP(DTIE)/Hg/INC.7/INF/6	Options and related governance arrangements under UNEP as the host institution that could best serve the Specific International Programme
UNEP(DTIE)/Hg/INC.7/INF/7	Draft public health strategies for artisanal and small-scale gold mining
UNEP(DTIE)/Hg/INC.7/INF/8	Update from the secretariat of the Basel, Rotterdam and Stockholm Conventions on joint guidance
UNEP(DTIE)/Hg/INC.7/INF/9	Update on activities by the regional centres of the Basel and Stockholm Conventions.

Table 2

Other documents relating to specific articles of the Minamata Convention on Mercury for the intergovernmental negotiating committee at its sixth session

Article of the Minamata Convention on Mercury	*Relevant working and information documents prepared for the first, second, third, fourth, fifth, sixth and seventh sessions*	*Relevant background documents*[1]
Article 1 **Objective**	**Relevant working documents prepared for the first session** UNEP(DTIE)/Hg/INC.1/6: Possible tool for tracking the progress of the intergovernmental negotiating committee in developing provisions of the global legally binding instrument on mercury UNEP(DTIE)/Hg/INC.1/16: International trade law that may be relevant to the future mercury instrument, including provisions on trade set out in selected conventions UNEP(DTIE)/Hg/INC.1/18: Relevant issues being considered in international forums and their possible impact on the mercury negotiation process UNEP(DTIE)/Hg/INC.1/19: Potential costs and benefits associated with each provision listed in paragraph 27 of Governing Council decision 25/5 UNEP(DTIE)/Hg/INC.1/INF/8: Potential costs and benefits associated with each provision listed in paragraph 27 of Governing Council decision 25/5	G. Report presenting the costs and benefits for each of the strategic objectives set out in annex I to the report of the first meeting of the Open-ended Working Group on Mercury, July 2008
Article 2 **Definitions**	**Relevant working documents prepared for the first session** UNEP(DTIE)/Hg/INC.1/14: Glossaries of key terms	
Article 3 **Mercury supply sources and trade**	**Relevant working documents prepared for the seventh session:** UNEP(DTIE)/Hg/INC.7/3: Draft guidance to assist parties in completing the forms required under Article 3 UNEP(DTIE)/Hg/INC.7/4: Draft guidance on identification of individual stocks of mercury or mercury compounds exceeding 50 metric tons, as well as sources of mercury supply generating stocks exceeding 10 metric tonnes per year UNEP(DTIE)/Hg/INC.7/5: Compilation of submissions on the question of whether additional guidance was necessary in accordance with paragraph 12 of article 3 of the Minamata Convention UNEP(DTIE)/Hg/INC.7/INF.3: Progress report on the UNEP Global Mercury Partnership **Relevant working document prepared for the second session:** UNEP(DTIE)/Hg/INC.2/15: Analysis of possible options for using partnerships to help achieve the goals of the future instrument on mercury UNEP(DTIE)/Hg/INC.2/INF/2: Guidelines on the environmentally sound management of elemental mercury and waste containing or contaminated with mercury	C. Summary of Supply, Trade and Demand Information on Mercury, November 2006 D. Mercury awareness-raising package, January 2009 H. Report on current supply and demand for mercury, including projections considering the phase-out of primary mercury mining, July 2008 J. Assessment of Excess Mercury in Asia, 2010–2050, May 2009 K. Assessment report: Excess mercury supply in Latin America and the Caribbean, 2010–2050, July 2009 L. Assessment report: Excess mercury supply in Eastern Europe and Central Asia, 2010–2050, April 2010 Q. Study on the possible effects on human health and the environment of the trade of products containing lead, cadmium and mercury in Latin America and the Caribbean, Asia and the Pacific and Africa

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[1] Descriptions of the background documents are provided in the appendix to the present annex.

Article of the Minamata Convention on Mercury	*Relevant working and information documents prepared for the first, second, third, fourth, fifth, sixth and seventh sessions*	*Relevant background documents*[1]
	Relevant working and information documents prepared for the first session: UNEP(DTIE)/Hg/INC.1/16: International trade law that may be relevant to the future mercury instrument, including provisions on trade set out in selected conventions UNEP(DTIE)/Hg/INC.1/19: Potential costs and benefits associated with each provision listed in paragraph 27 of Governing Council decision 25/5 UNEP(DTIE)/Hg/INC.1/20: Update of information on the supply and trade of mercury UNEP(DTIE)/Hg/INC.1/INF/8: Potential costs and benefits associated with each provision listed in paragraph 27 of Governing Council decision 25/5 UNEP(DTIE)/Hg/INC.1/INF/9: Update of information on the supply and trade of mercury UNEP(DTIE)/Hg/INC.1/INF/10: Update on activities related to mercury supply and the environmentally sound storage of mercury	
Article 4 **Mercury-added products** **Article 5** **Manufacturing processes in which mercury or mercury compounds are used** **Article 6** **Exemptions available to a Party upon request**	**Relevant working documents prepared for the sixth session:** UNEP(DTIE)/Hg/INC.6/6: Draft proposal on the format for registering exemptions UNEP(DTIE)/Hg/INC.6/7: Proposal on information to be supplied when registering an exemption UNEP(DTIE)/Hg/INC.6/8: Proposal on the register of exemptions to be maintained by the secretariat, including information on the maintenance of information supplied by States and regional economic integration organizations upon becoming parties UNEP(DTIE)/Hg/INC.6/INF.3: Progress report on the UNEP Global Mercury Partnership **Relevant working documents prepared for the fourth session:** UNEP(DTIE)/Hg/INC.4/6: Information on possible transitional arrangements pending phase out of mercury-added products and manufacturing processes in which mercury is used **Relevant working document prepared for the third session:** UNEP(DTIE)/Hg/INC.3/6: Addressing health in the mercury instrument **Relevant working documents prepared for the second session:** UNEP(DTIE)/Hg/INC.2/11: Mercury-containing products, processes and technologies and their alternatives UNEP(DTIE)/Hg/INC.2/12: Cost-benefit analysis of existing alternatives to mercury-based products, processes and technologies UNEP(DTIE)/Hg/INC.2/13: Options for regulating mercury in products UNEP(DTIE)/Hg/INC.2/17: Global inventory of mercury cell chlor-alkali facilities	C. Summary of Supply, Trade and Demand Information on Mercury, November 2006 D. Mercury awareness-raising package, January 2009 F. Guide for Reducing Major Uses and Releases of Mercury, June 2006 H. Report on current supply and demand for mercury, including projections considering the phase-out of primary mercury mining, July 2008 I. Report on the major mercury-containing products and processes, their substitutes and experience in switching to mercury-free products and processes, July 2008 V. Economics of Conversion to Mercury-Free Products, October 2011 X. Research and Development Progress of and Feasibility Study Report on Mercury-free Catalyst in China, December 2011 Z. Global Mercury Assessment: Sources, Emissions, Releases and Environmental Transport, February 2013 AA. Global Chemicals Outlook: Towards Sound Management of Chemicals. Synthesis Report for Decision Makers, September 2012 CC. Replacing mercury-added products and promoting improved management of mercury-added products waste in Madagascar, March 2015.

Article of the Minamata Convention on Mercury	*Relevant working and information documents prepared for the first, second, third, fourth, fifth, sixth and seventh sessions*	*Relevant background documents*[1]
	Relevant working and information documents prepared for the first session: UNEP(DTIE)/Hg/INC.1/13: Concept of essential use in international agreements	EE. Reducing demand for mercury added products in Bangladesh, December 2015
Article 7 **Artisanal and small-scale gold mining**	**Relevant working document prepared for the seventh session:** UNEP(DTIE)/Hg/INC.7/17: Draft guidance on developing a national action plan to reduce and, where feasible, eliminate mercury use in artisanal and small-scale gold mining **Relevant working documents prepared for the sixth session:** UNEP(DTIE)/Hg/INC.6/16: Initial proposal for guidance and assistance to countries with artisanal and small-scale gold mining in the development of national plans UNEP(DTIE)/Hg/INC.6/INF.3: Progress report on the UNEP Global Mercury Partnership **Relevant working document prepared for the fourth session:** UNEP(DTIE)/Hg/INC.4/7: Compilation of reporting obligations and action plans envisaged in the draft negotiating text and survey of reporting obligations and action plans under other relevant multilateral environment agreements **Relevant working documents prepared for the second session:** UNEP(DTIE)/Hg/INC.2/8: Inventory of projects completed or under way in each country relating to artisanal and small-scale gold mining, including awareness-raising, technical assistance, formalization and financial assistance projects UNEP(DTIE)/Hg/INC.2/9: Methodologies for determining mercury exposure in people involved in artisanal and small-scale gold mining UNEP(DTIE)/Hg/INC.2/12: Cost-benefit analysis of existing alternatives to mercury-based products, processes and technologies **Relevant working and information documents prepared for the first session:** UNEP(DTIE)/Hg/INC.1/19: Potential costs and benefits associated with each provision listed in paragraph 27 of Governing Council decision 25/5 UNEP(DTIE)/Hg/INC.1/INF/8: Potential costs and benefits associated with each provision listed in paragraph 27 of Governing Council decision 25/5	C. Summary of Supply, Trade and Demand Information on Mercury, November 2006 D. Mercury awareness-raising package, January 2009 F. Guide for Reducing Major Uses and Releases of Mercury, June 2006 H. Report on current supply and demand for mercury, including projections considering the phase-out of primary mercury mining, July 2008 I. Report on the major mercury-containing products and processes, their substitutes and experience in switching to mercury-free products and processes, July 2008 S. Analysis of formalization approaches in the artisanal and small-scale gold mining sector based on experiences in Ecuador, Mongolia, Peru, Tanzania and Uganda, June 2012 T. Reducing Mercury Use in Artisanal and Small-scale Gold mining: A practical guide. Introduction to the document and draft technical document, June 2012 U. Environment for Development Perspectives: Mercury Use in Artisanal and Small-scale Gold Mining, August 2011 Z. Global Mercury Assessment 2013: Sources, Emissions, Releases and Environmental Transport, February 2013 AA. Global Chemicals Outlook: Towards Sound Management of Chemicals. Synthesis Report for Decision Makers, September 2012 GG. Website on ASGM National Action Plan Guidance, UNEP Global Mercury Partnership

Article of the Minamata Convention on Mercury	*Relevant working and information documents prepared for the first, second, third, fourth, fifth, sixth and seventh sessions*	*Relevant background documents*[1]
Article 8 **Emissions** **Article 9** **Releases**	**Relevant working documents prepared for the seventh session:** UNEP(DTIE)/Hg/INC.7/6: Report of the group of technical experts on the development of guidance required under article 8 of the Convention UNEP(DTIE)/Hg/INC.7/6/Add1: Draft guidance on best available techniques and best environmental practices UNEP(DTIE)/Hg/INC.7/6/Add2: Draft guidance on support for parties in implementing the measures set out in paragraph 5 of article 8, in particular in determining goals and in setting emission limit values UNEP(DTIE)/Hg/INC.7/6/Add3: Draft guidance on criteria that parties may develop pursuant to paragraph 2 (b) of article 8 UNEP(DTIE)/Hg/INC.7/6/Add4: Draft guidance on preparing inventories of emissions UNEP(DTIE)/Hg/INC.7/INF1: Comments received on Best Available Techniques and Best Environmental Practices guidance documents during the public comment period UNEP(DTIE)/Hg/INC.7/INF.3: Progress report on the UNEP Global Mercury Partnership **Relevant working document prepared for the fifth session:** UNEP(DTIE)/Hg/INC.5/4: Air emission thresholds for facilities and information on releases to land and water UNEP(DTIE)/Hg/INC.5/INF/1: Air emission thresholds for facilities and information on releases to land and water **Relevant working documents prepared for the fourth session:** UNEP(DTIE)/Hg/INC.4/5: Approach to possible elements of Articles 10 and 11 prepared by the co-chairs of the contact group on emissions and releases UNEP(DTIE)/Hg/INC.4/7: Compilation of reporting obligations and action plans envisaged in the draft negotiating text and survey of reporting obligations and action plans under other relevant multilateral environment agreements **Relevant working document prepared for the third session:** UNEP(DTIE)/Hg/INC.3/5: Releases of mercury from the oil and gas industry **Relevant working and information documents prepared for the second session:** UNEP(DTIE)/Hg/INC.2/4: Study on mercury sources and emissions and analysis of the cost and effectiveness of control measures UNEP(DTIE)/Hg/INC.2/16: Relationship between the future mercury instrument and the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal	B1. Global Mercury Assessment 2013: Sources, Emissions, Releases and Environmental Transport, January 2013 (summary report for policy makers and technical background report. The Technical Background Report includes calculated emission inventories for all countries). B2. Global Mercury Modelling: Update of Modelling Results in the Global Mercury Assessment 2013 (June 2015) D. Mercury awareness-raising package, January 2009 E1. Toolkit for Identification and Quantification of Mercury Releases, Guidelines for inventory level 1 and level 2, 2015 E2: MercuryLearn Platform, an online training platform to enhance the usability of the UNEP Toolkit as a standard methodology to prepare national mercury emissions and releases inventories. F. Guide for Reducing Major Uses and Releases of Mercury, June 2006 Y. Process Optimization Guidance (POG) for Reducing Mercury Emissions from Coal Combustion in Power Plants (report) and software (iPOG). AA. Global Chemicals Outlook: Towards Sound Management of Chemicals. Synthesis Report for Decision Makers, September 2012

Article of the Minamata Convention on Mercury	*Relevant working and information documents prepared for the first, second, third, fourth, fifth, sixth and seventh sessions*	*Relevant background documents*[1]
	UNEP(DTIE)/Hg/INC.2/18: Process optimization guidance for reducing mercury emissions from coal combustion in power plants *(executive summary)* UNEP(DTIE)/Hg/INC.2/INF/2: Guidelines on the environmentally sound management of elemental mercury and waste containing or contaminated with mercury UNEP(DTIE)/Hg/INC.2/INF/5: Process optimization guidance for reducing mercury emissions from coal combustion in power plants *(full report)* **Relevant working and information documents prepared for the first session:** UNEP(DTIE)/Hg/INC.1/15: Progress in the preparation of the study called for in paragraph 29 of Governing Council decision 25/5	
Article 10 Environmentally sound interim storage of mercury, other than waste mercury	**Relevant working document prepared for the seventh session:** UNEP(DTIE)/Hg/INC.7/18: Environmentally sound interim storage: compilation and summary of submissions; identification of relevant sections of the Basel guidance; and a roadmap for work on interim guidance. **Relevant working documents prepared for the sixth session:** UNEP(DTIE)/Hg/INC.6/17: Development of guidance on the environmentally sound interim storage of mercury UNEP(DTIE)/Hg/INC.6/INF.3: Progress report on the UNEP Global Mercury Partnership **Relevant working document prepared for the fifth session:** UNEP(DTIE)/Hg/INC.5/4: Air emission thresholds for facilities and information on releases to land and water UNEP(DTIE)/Hg/INC.5/ INF/1: Air emission thresholds for facilities and information on releases to land and water **Relevant working documents prepared for the third session:** UNEP(DTIE)/Hg/INC.3/7: Relationship between the future mercury instrument and the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal **Relevant working and information documents prepared for the second session:** UNEP(DTIE)/Hg/INC.2/4: Study on mercury sources and emissions and analysis of the costs and effectiveness of control measures UNEP(DTIE)/Hg/INC.2/16: Relationship between the future mercury instrument and the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal UNEP(DTIE)/Hg/INC.2/INF/2: Guidelines on the environmentally sound management of elemental mercury and waste containing or contaminated with mercury	B1. Global Mercury Assessment 2013: Sources, Emissions, Releases and Environmental Transport, January 2013 (Summary report for policy makers and fully referenced and detailed Technical Background Report). D. Mercury awareness-raising package, January 2009 E1. Toolkit for Identification and Quantification of Mercury Releases, Guidelines for inventory level 1 and level 2, 2015 F. Guide for Reducing Major Uses and Releases of Mercury, June 2006 M. Options Analysis and Feasibility Study for the Long-Term Storage of Mercury in Latin America and the Caribbean, October 2010 N. Analysis of options for the environmentally sound management of surplus mercury in Asia and the Pacific, September 2011 P. Management of Mercury and Mercury-Containing Waste: Final Project Report, June 2010 W. A guide for managing mercury waste at household and community level, August 2011 Several reports produced in the context of the mercury waste partnership area are relevant to the mercury waste issue and are available at: http://www.unep.org/chemicalsandwaste/Mercury/InterimActivities/Partnerships/WasteManagement/tabid/3535/language/en-US/Default.aspx FF. Practical Sourcebook on Mercury Waste Storage and Disposal, UNEP, September 2015

Article of the Minamata Convention on Mercury	*Relevant working and information documents prepared for the first, second, third, fourth, fifth, sixth and seventh sessions*	*Relevant background documents*[1]
	Relevant working and information documents prepared for the first session: UNEP(DTIE)/Hg/INC.1/INF/3: Information supplied by the secretariat of the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal	
Article 11 **Mercury wastes**	**Relevant working document prepared for the seventh session:** UNEP(DTIE)/Hg/INC.7/19: Compilation of information on the use of mercury waste thresholds **Relevant working documents prepared for the sixth session:** UNEP(DTIE)/Hg/INC.6/18: Consideration of the thresholds for identification of mercury waste UNEP(DTIE)/Hg/INC.6/INF.3: Progress report on the UNEP Global Mercury Partnership UNEP(DTIE)/Hg/INC.6/INF.10: Status of work on the updating of the technical guidelines for the environmentally sound management of wastes consisting of elemental mercury and wastes containing or contaminated with mercury under the Basel Convention **Relevant working document prepared for the fifth session:** UNEP(DTIE)/Hg/INC.5/4: Air emission thresholds for facilities and information on releases to land and water UNEP(DTIE)/Hg/INC.5/ INF/1: Air emission thresholds for facilities and information on releases to land and water **Relevant working documents prepared for the third session:** UNEP(DTIE)/Hg/INC.3/5: Releases of mercury from the oil and gas industry UNEP(DTIE)/Hg/INC.3/7: Relationship between the future mercury instrument and the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal **Relevant working and information documents prepared for the second session:** UNEP(DTIE)/Hg/INC.2/4: Study on mercury sources and emissions and analysis of the costs and effectiveness of control measures UNEP(DTIE)/Hg/INC.2/16: Relationship between the future mercury instrument and the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal UNEP(DTIE)/Hg/INC.2/INF/2: Guidelines on the environmentally sound management of elemental mercury and waste containing or contaminated with mercury **Relevant working and information documents prepared for the first session:** UNEP(DTIE)/Hg/INC.1/INF/3: Information supplied by the secretariat of the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal	B1. Global Mercury Assessment 2013: Sources, Emissions, Releases and Environmental Transport, January 2013 (Summary report for policy makers and fully referenced and detailed Technical Background Report). D. Mercury awareness-raising package, January 2009 E1. Toolkit for Identification and Quantification of Mercury Releases, Guidelines for inventory level 1 and level 2, 2015 and the MercuryLearn Platform (see under article 8) F. Guide for Reducing Major Uses and Releases of Mercury, June 2006 M. Options Analysis and Feasibility Study for the Long-Term Storage of Mercury in Latin America and the Caribbean, October 2010 N. Analysis of options for the environmentally sound management of surplus mercury in Asia and the Pacific, September 2011 P. Management of Mercury and Mercury-Containing Waste: Final Project Report, June 2010 W. A guide for managing mercury waste at household and community level, August 2011 Several reports produced in the context of the mercury waste partnership area are relevant to the mercury waste issue and are available at: www.unep.org/chemicalsandwaste/Mercury/InterimActivities/Partnerships/WasteManagement/tabid/3535/language/en-US/Default.aspx BB. Promoting the 'phase down' Approach of Dental Amalgam in Developing countries – Tanzania, October 2014. FF. Practical Sourcebook on Mercury Waste Storage and Disposal, UNEP, September 2015

Article of the Minamata Convention on Mercury	*Relevant working and information documents prepared for the first, second, third, fourth, fifth, sixth and seventh sessions*	*Relevant background documents*[1]
Article 12 **Contaminated sites**	**Relevant working documents prepared for the seventh session:** UNEP(DTIE)/Hg/INC.7/20: Guidance on managing contaminated sites and the proposed way forward for developing guidance **Relevant working documents prepared for the sixth session:** UNEP(DTIE)/Hg/INC.6/19: Guidance on managing contaminated sites and the proposed way forward for developing guidance UNEP(DTIE)/Hg/INC.6/INF.3: Progress report on the UNEP Global Mercury Partnership **Relevant working document prepared for the fifth session:** UNEP(DTIE)/Hg/INC.5/4: Air emission thresholds for facilities and information on releases to land and water UNEP(DTIE)/Hg/INC.5/INF/1: Air emission thresholds for facilities and information on releases to land and water **Relevant working documents prepared for the third session:** UNEP(DTIE)/Hg/INC.3/5: Releases of mercury from the oil and gas industry UNEP(DTIE)/Hg/INC.3/7: Relationship between the future mercury instrument and the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal **Relevant working and information documents prepared for the second session:** UNEP(DTIE)/Hg/INC.2/4: Study on mercury sources and emissions and analysis of the costs and effectiveness of control measures UNEP(DTIE)/Hg/INC.2/16: Relationship between the future mercury instrument and the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal UNEP(DTIE)/Hg/INC.2/INF/2: Guidelines on the environmentally sound management of elemental mercury and waste containing or contaminated with mercury **Relevant working and information documents prepared for the first session:** UNEP(DTIE)/Hg/INC.1/INF/3: Information supplied by the secretariat of the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal	B1. Global Mercury Assessment 2013: Sources, Emissions, Releases and Environmental Transport, January 2013 (Summary report for policy makers and fully referenced and detailed Technical Background Report).D. Mercury awareness-raising package, January 2009 E1. Toolkit for Identification and Quantification of Mercury Releases, Guidelines for inventory level 1 and level 2, 2015 and the MercuryLearn Platform (see under article 8) F. Guide for Reducing Major Uses and Releases of Mercury, June 2006 M. Options Analysis and Feasibility Study for the Long-Term Storage of Mercury in Latin America and the Caribbean, October 2010 N. Analysis of options for the environmentally sound management of surplus mercury in Asia and the Pacific, September 2011 P. Management of Mercury and Mercury-Containing Waste: Final Project Report, June 2010 W. A guide for managing mercury waste at household and community level, August 2011 Several reports produced in the context of the mercury waste partnership area are relevant to the mercury waste issue and are available at: www.unep.org/chemicalsandwaste/Mercury/InterimActivities/Partnerships/WasteManagement/tabid/3535/language/en-US/Default.aspx
Article 13 **Financial resources and mechanism** **Article 14** **Capacity-building, technical assistance**	**Relevant working documents prepared for the seventh session:** UNEP(DTIE)/Hg/INC.7/7: Draft memorandum of understanding between the Conference of the Parties of the Minamata Convention on Mercury and the Council of the Global Environment Facility UNEP(DTIE)/Hg/INC.7/8: Draft guidance to the Global Environment Facility on overall strategies, policies, programme priorities, eligibility for access to and utilization of financial	G. Report presenting the costs and benefits for each of the strategic objectives set out in annex I to the report of the first meeting of the Open-ended Working Group on Mercury, July 2008 R. Overarching Framework: UNEP Global Mercury Partnership, June 2009

Article of the Minamata Convention on Mercury	*Relevant working and information documents prepared for the first, second, third, fourth, fifth, sixth and seventh sessions*	*Relevant background documents*[1]
and technology transfer	resources and on an indicative list of categories of activities that could receive support from the Global Environment Facility Trust Fund UNEP(DTIE)/Hg/INC.7/9: Report by the co-chairs of the ad hoc working group of experts on financing established at the sixth session of the intergovernmental negotiating committee UNEP(DTIE)/Hg/INC.INF/6: Options and related governance arrangements under UNEP as the host institution that could best serve the Specific International Programme **Relevant working documents prepared for the sixth session:** UNEP(DTIE)/Hg/INC.6/20: Initial consideration of the operation of the financial mechanism, in particular relating to the specific international programme to support capacity-building and technical assistance UNEP(DTIE)/Hg/INC.6/21: Input to preliminary draft guidance on overall strategies, policies, programme priorities and eligibility for access to and utilization of financial resources, and of an indicative list of categories of activities to be funded by the Global Environment Facility trust fund UNEP(DTIE)/Hg/INC.6/23: Progress towards development of a memorandum of understanding between the Conference of the Parties and the Council of the Global Environment Facility UNEP(DTIE)/Hg/INC.6/INF/2: Terms of reference for the Special Programme to support institutional strengthening at the national level for implementation of the Basel, Rotterdam and Stockholm Conventions, the Minamata Convention and the Strategic Approach to International Chemicals Management UNEP(DTIE)/Hg/INC.6/INF/6: Report on activities of the Global Environment Facility in relation to the Minamata Convention during the interim period UNEP(DTIE)/Hg/INC.6/INF/7: Progress report on the work of the interim secretariat UNEP(DTIE)/Hg/INC.6/INF/8: Examples of memorandums of understanding between the Council of the Global Environment Facility and the governing bodies of multilateral environmental agreements UNEP(DTIE)/Hg/INC.6/INF/9: Strengthening the sound management of chemicals and wastes in the long term **Relevant working document prepared for the fifth session:** UNEP(DTIE)/Hg/INC.5/6: Draft elements of the final act to be adopted at the anticipated diplomatic conference **Relevant working and information documents prepared for the fourth session:** UNEP(DTIE)/Hg/INC.4/4: Proposal for a conceptual approach and possible text on financial resources and technical assistance UNEP(DTIE)/Hg/INC.4/INF/1: Information submitted by parties on financial resources and technical and implementation assistance	Z. Report on Overall Progress of the United Nations Environment Programme Global Mercury Partnership, July 2010 – June 2012 Y. Process Optimization Guidance (POG) for Reducing Mercury Emissions from Coal Combustion in Power Plants (report) and software (iPOG).

Article of the Minamata Convention on Mercury	*Relevant working and information documents prepared for the first, second, third, fourth, fifth, sixth and seventh sessions*	*Relevant background documents*[1]
	Relevant working and information documents prepared for the third session: UNEP(DTIE)/Hg/INC.3/4: Further comparative analysis of options for financial mechanisms to support the global legally binding instrument on mercury UNEP(DTIE)/Hg/INC3/INF/3: Progress of the consultative process on financing options for chemicals and wastes led by the United Nations Environment Programme **Relevant working documents prepared for the second session:** UNEP(DTIE)/Hg/INC.2/14: Analysis of possible funding sources and what they might cover, including an analysis of the role of the private sector UNEP(DTIE)/Hg/INC.2/15: Analysis of possible options for using partnerships to help achieve the goals of the future instrument on mercury **Relevant working and information documents prepared for the first session:** UNEP(DTIE)/Hg/INC.1/8: Options for predictable and efficient financial assistance arrangements UNEP(DTIE)/Hg/INC.1/9: Options for delivery of technical assistance and capacity-building: examples from multilateral environmental agreements and other organizations UNEP(DTIE)/Hg/INC.1/10: Facilitating sustainable technology transfer and support for global mercury control actions: experience within existing legally binding and voluntary arrangements UNEP(DTIE)/Hg/INC.1/19: Potential costs and benefits associated with each provision listed in paragraph 27 of Governing Council decision 25/5 UNEP(DTIE)/Hg/INC.1/INF/5: Progress of the consultative process on financing options for chemicals and wastes led by the United Nations Environment Programme UNEP(DTIE)/Hg/INC.1/INF/8: Potential costs and benefits associated with each provision listed in paragraph 27 of Governing Council decision 25/5	
Article 15 Implementation and Compliance Committee	**Relevant working and information documents prepared for the first session:** UNEP(DTIE)/Hg/INC.1/11: Key concepts, procedures and mechanisms of legally binding multilateral agreements that may be relevant to furthering compliance under the future mercury instrument	

Article of the Minamata Convention on Mercury	*Relevant working and information documents prepared for the first, second, third, fourth, fifth, sixth and seventh sessions*	*Relevant background documents*[1]
Article 16 **Health aspects**	**Relevant working and information documents prepared for the sixth session:** UNEP(DTIE)/Hg/INC.6/INF/4: Resolution on mercury adopted by the World Health Assembly at its sixty-seventh session UNEP(DTIE)/Hg/INC.6/INF/5: Progress report on cooperation and coordination with other actors **Relevant working document prepared for the fifth session:** UNEP(DTIE)/Hg/INC.5/5: Analysis of the extent to which the provisions of the draft mercury instrument reflect the content of article 20 bis on health aspects **Relevant working document prepared for the third session:** UNEP(DTIE)/Hg/INC.3/6: Addressing health in the mercury instrument **Relevant working and information documents prepared for the second session:** UNEP(DTIE)/Hg/INC 2/5: Report on indicators to evaluate and track the health impacts of mercury and identify vulnerable populations UNEP(DTIE)/Hg/INC.2/6: Report on information on harmonized systems for measuring mercury body burden UNEP(DTIE)/Hg/INC.2/7: Existing country-specific or regional monitoring efforts relating to fish and marine mammals in the food supply UNEP(DTIE)/Hg/INC.2/9: Methodologies for determining mercury exposure in people involved in artisanal and small-scale gold mining UNEP(DTIE)/Hg/INC.2/19: Executive summary of the document on guidance for identifying populations at risk from mercury exposure UNEP(DTIE)/Hg/INC.2/INF/3: Guidance for identifying populations at risk from mercury exposure	
Article 17 **Information exchange** **Article 18** **Public information, awareness and education** **Article 19** **Research, development and monitoring**	**Relevant working and information documents prepared for the sixth session:** UNEP(DTIE)/Hg/INC.6/INF/4: Resolution on mercury adopted by the World Health Assembly at its sixty-seventh session **Relevant working and information documents prepared for the second session:** UNEP(DTIE)/Hg/INC.2/5: Report on indicators to evaluate and track the health impacts of mercury and identify vulnerable populations UNEP(DTIE)/Hg/INC.2/6: Report on information on harmonized systems for measuring mercury body burden UNEP(DTIE)/Hg/INC.2/7: Existing country-specific or regional monitoring efforts relating to fish and marine mammals in the food supply	A. Global Mercury Assessment, December 2002 B1. Global Mercury Assessment 2013: Sources, Emissions, Releases and Environmental Transport, January 2013 (Summary report for policy makers and fully referenced and detailed Technical Background Report). D. Mercury awareness-raising package, January 2009 E1. Toolkit for Identification and Quantification of Mercury Releases, Guidelines for inventory level 1 and level 2, April 2015 F. Guide for Reducing Major Uses and Releases of Mercury, June 2006

Article of the Minamata Convention on Mercury	*Relevant working and information documents prepared for the first, second, third, fourth, fifth, sixth and seventh sessions*	*Relevant background documents*[1]
	UNEP(DTIE)/Hg/INC.2/8: Inventory of projects completed or under way in each country relating to artisanal and small-scale gold mining, including awareness-raising, technical assistance, formalization and financial assistance projects UNEP(DTIE)/Hg/INC.2/9: Methodologies for determining mercury exposure in people involved in artisanal and small-scale gold mining UNEP(DTIE)/Hg/INC.2/10/Rev.1: Collation and analysis of available data or mercury releases in relevant sectors at the national level UNEP(DTIE)/Hg/INC.2/19: Executive summary of the document on guidance for identifying populations at risk from mercury exposure UNEP(DTIE)/Hg/INC.2/INF/3: Guidance for identifying populations at risk from mercury exposure **Relevant working and information documents prepared for the first session:** UNEP(DTIE)/Hg/INC.1/12: Effectiveness evaluation in other conventions and possible approaches to establishing baselines	
Article 20 **Implementation plans**	**Relevant working document prepared for the fourth session:** UNEP(DTIE)/Hg/INC.4/7: Compilation of reporting obligations and action plans envisaged in the draft negotiating text and survey of reporting obligations and action plans under other relevant multilateral environment agreements	
Article 21 **Reporting**	**Relevant working documents prepared for the seventh session:** UNEP(DTIE)/Hg/INC.7/10: Draft reporting format as amended by the intergovernmental negotiating committee on mercury at its sixth session UNEP(DTIE)/Hg/INC.7/11: Compilation of information on the frequency of reporting under other multilateral environmental agreements, including the Basel, Rotterdam and Stockholm conventions, along with available data on the submission of reporting rates under other agreements **Relevant working document prepared for the fourth session:** UNEP(DTIE)/Hg/INC.4/7: Compilation of reporting obligations and action plans envisaged in the draft negotiating text and survey of reporting obligations and action plans under other relevant multilateral environment agreements **Relevant working and information documents prepared for the first session:** UNEP(DTIE)/Hg/INC.1/11: Key concepts, procedures and mechanisms of legally binding multilateral agreements that may be relevant to furthering compliance under the future mercury instrument	

Article of the Minamata Convention on Mercury	*Relevant working and information documents prepared for the first, second, third, fourth, fifth, sixth and seventh sessions*	*Relevant background documents*[1]
Article 22 **Effectiveness evaluation**	**Relevant working and information document prepared for the seventh session:** UNEP(DTIE)/Hg/INC.7/12: Compilation and analysis of the means of obtaining monitoring data in relation to effectiveness evaluation **Relevant working and information document prepared for the first session:** UNEP(DTIE)/Hg/INC.1/12: Effectiveness evaluation in other conventions and possible approaches to establishing baselines	
Article 23 **Conference of the Parties**	**Relevant working and information documents prepared for the seventh session:** UNEP(DTIE)/Hg/INC.7/13: Draft rules of procedure for the Conference of the Parties to the Minamata Convention on Mercury UNEP(DTIE)/Hg/INC.7/14: Draft financial rules for the Conference of the Parties to the Minamata Convention on Mercury	
Article 24 **Secretariat**	**Relevant working and information documents prepared for the seventh session:** UNEP(DTIE)/Hg/INC.7/15: Report on proposals on how the Executive Director of the United Nations Environment Programme will perform the functions of the permanent secretariat for the Minamata Convention on Mercury UNEP(DTIE)/Hg/INC.7/16: Analysis of offers to host the permanent secretariat of the Minamata Convention on Mercury UNEP(DTIE)/Hg/INC.INF/5: Offer to host the permanent secretariat from the Government of Switzerland	

Appendix

Background documents for the consideration of the intergovernmental negotiating committee to prepare a global legally binding instrument on mercury

A. Global Mercury Assessment, December 2002 (available in English, French and Spanish at www.unep.org/chemicalsandwaste/Metals/Mercury/Informationmaterials/ReportsandPublications/tabid/3593/Default.aspx)

1. The Global Mercury Assessment was submitted to the Governing Council at its twenty-second session. It provides information on many aspects of mercury, including chemistry, toxicology, impacts on human health and the environment and global cycling of mercury. It also provides information on the uses of mercury, prevention and control technologies available at the time and initiatives for controlling releases and limiting use and exposure. It formed the basis for Governing Council decision 22/4 of 7 February 2003, in which the Governing Council concluded that mercury posed global problems and required increased action.

B1. Global Mercury Assessment 2013: Sources, Emissions, Releases and Environmental Transport, January 2013 (summary report and technical background report available in English at http://www.unep.org/chemicalsandwaste/Mercury/Informationmaterials/ReportsandPublications/tabid/3593/Default.aspx)

2. The 2013 update of the 2008 report on the global atmospheric mercury assessment was requested by the Governing Council of UNEP at its twenty-fifth session. The document was officially issued during the fifth session of the intergovernmental negotiating committee and information was made available to participants.

3. This report presents sources of mercury emissions to air and water. It presents estimates of anthropogenic emissions to air from various sources based on data from 2010 and estimates for releases to aquatic environment. The report also presents the latest information on atmospheric and aquatic chemistry, fate and transport. It is an overall summary report for policy makers based on a technical background report.

4. The Technical Background Report for the Global Mercury Assessment 2013 is a joint report of UNEP and the Arctic Monitoring and Assessment Programme (a working group under the Arctic Council) which presents the latest comprehensive information on global mercury emissions and releases to the environment, information on atmospheric and aquatic chemistry and fate and transport of mercury. The report is a fully referenced scientific background report for *Global Mercury Assessment 2013: Sources, Emissions, Releases and Environmental Transport*. It contains calculated emissions inventories for all countries.

B2. Global Mercury Modelling: Update of Modelling Results in the Global Mercury Assessment 2013 (available in English at: http://unep.org/chemicalsandwaste/Mercury/ReportsandPublications/tabid/3593/Default.aspx)

5. The report aims to update the information presented in the Technical Background Report for the Global Mercury Assessment 2013 (AMAP/UNEP, 2013) with new model simulation results and focusing on an evaluation of mercury intercontinental transport (quantifying global patterns of mercury air concentration and deposition) and source attribution of mercury deposition to major geographical regions and aquatic areas of the global ocean.

C. Summary of Supply, Trade and Demand Information on Mercury, November 2006 (available in English at www.unep.org/chemicalsandwaste/Metals/Mercury/Informationmaterials/ReportsandPublications/tabid/3593/Default.aspx)

6. The report on supply, trade and demand information on mercury was prepared to inform discussions by the Governing Council at its twenty-fourth session. The report draws upon information submitted by Governments and publicly available databases. It also specifically considers trade in mercury used in artisanal and small-scale mining. It sets out the most common sources of mercury for the global supply, the overall extent of and changes in the global supply, the range of uses of mercury and the demand for mercury in the global supply. It outlines potential scenarios for mercury demand, based both on the status quo at the time the report was prepared and on a focused mercury reduction programme. Information is provided on trends in the price of mercury and the global trade in mercury, subject to the caveat that the clandestine nature of some illegal activities makes it difficult to accurately determine the extent of all mercury trade.

D. Mercury awareness-raising package, January 2009 (available in English, French and Spanish at www.unep.org/chemicalsandwaste/Mercury/ReportsandPublications/AwarenessRaisingPackage/tabid/4022/Default.aspx)

7. The publication is intended to raise stakeholder awareness of the effects of mercury on human health, wildlife and the environment and of strategies to manage and control mercury. It is designed for use by government officials, community leaders and workers. It is intended to contribute to building public support and capacity to take preventive action. It includes a user's guide, an overview and five thematic modules on mercury in products and wastes, mercury and industry, mercury use in artisanal and small-scale gold mining, mercury use in health-care settings and dentistry, and cultural uses of mercury.

E1. Toolkit for Identification and Quantification of Mercury Releases, Guidelines for inventory level 1 and level 2, April 2015 (available in English at www.unep.org/chemicalsandwaste/Mercury/MercuryPublications/GuidanceTrainingMaterialToolkits/MercuryToolkit/tabid/4566/language/en-US/Default.aspx)

8. The Toolkit is intended to assist countries in developing a national mercury releases inventory. It provides a standardized methodology and accompanying database enabling the development of consistent national and regional mercury inventories. National inventories will assist countries in identifying and addressing mercury releases and thus assist them in evaluating the risks from various sources. Comparable sets of mercury source release data will enhance international cooperation, discussion, goal-definition and assistance.

9. It comprises a procedure recommended by the United Nations Environment Programme for the effective compilation of mercury source and release inventories, given that comparable sets of mercury source release data can enhance international cooperation, discussion, goal-definition and assistance. Comparable data sets also help to establish a global picture of the scale of releases as a step in prioritizing actions to control or reduce releases and enlarging the international knowledge base on mercury uses and releases.

10. The Toolkit guides the inventory developer through the different stages of identifying sources and quantifying the consumption and releases of mercury from these sources. It provides a methodology, examples and extensive information on mercury release sources. The Toolkit has been revised in 2013 based on experiences in using it and new data and exists in two versions:

11. "Inventory Level 1" provides a simplified version of the Toolkit, as well as calculation spreadsheets and a reporting template, to make the development of an overview mercury inventory considerably easier.

12. "Inventory Level 2" is the comprehensive version that includes a detailed description of all mercury sources and is useful for anyone wishing to learn more about a specific mercury release source, including environmental authorities and researchers.

E2. MercuryLearn Platform (available in English at: http://mercurylearn.unitar.org/)

13. Based on the Toolkit, the e-learning platform (MercuryLearn) has been developed in cooperation with UNITAR (available in English)

14. This tool is developed to introduce the Toolkit to first-time users, serve as a reference tool for trained users, and enhance the usability of the UNEP Toolkit as a standard methodology. The approach of the training platform is to provide the technical information in the Toolkit in a visual manner, with interactive activities, maps, videos and exercises. It also provides a platform for experts to exchange information and experiences in preparing inventories.

F. Guide for Reducing Major Uses and Releases of Mercury, June 2006 (available in English at www.unep.org/chemicalsandwaste/Metals/Mercury/Informationmaterials/ReportsandPublications/tabid/3593/Default.aspx)

15. The guide is intended to assist countries in strengthening their knowledge base, identifying sources of possible mercury exposure and readily assessing the viability of the main methods of reducing mercury exposures and risks to populations. The information provided reflects approaches considered or implemented in some countries, industries or products to reduce or eliminate mercury releases, which may not apply to all situations. Whether approaches are applied in a particular country depends upon government and local priorities, information and education about possible risks, the legal framework, enforcement, implementation costs, perceived benefits and other factors.

G. Report presenting the costs and benefits for each of the strategic objectives set out in annex I to the report of the first meeting of the Open-ended Working Group on Mercury, July 2008 (UNEP(DTIE)/Hg/OEWG.2/5/Add.1, available in all six official United Nations languages at mercuryconvention.org/Negotiations/OEWG2/tabid/3432/Default.aspx)[a]

16. The report provides a general qualitative assessment of potential costs and benefits for each of the priority areas for mercury, classifying such costs and benefits as small, medium, large or not applicable. For purposes of the assessment, the cost of each strategic objective is the overall cost associated with implementing it, while the benefit is considered to be the extent to which achievement of the objective would reduce mercury-related risks on a global basis, distinguishing between local and global risk-reduction benefits. The final conclusion of the report is that investing in the reduction of mercury emissions and exposure will produce health and environmental benefits. It finds that technological measures, such as the installation of equipment to remove mercury from flue gases in electric power plants, waste incinerators and smelters, are relatively expensive (medium to high costs) compared to non-technological measures such as prevention, capacity-building and the promotion of mercury-containing waste separation (low to medium costs). Both groups of measures, however, would result in large benefits and their parallel application, resources permitting, would be appropriate.

H. Report on current supply and demand for mercury, including projections considering the phase-out of primary mercury mining, July 2008 (UNEP(DTIE)/Hg/OEWG.2/6/Add.1, available in all six official United Nations languages at mercuryconvention.org/Negotiations/OEWG2/tabid/3432/Default.aspx)

17. The report provides an assessment of whether projected demand for mercury could be met if primary mining were phased out. It also provides, based on available information, a brief summary of major sources of mercury releases by country or, if available country-level data is insufficient, by region. The report draws on, among other sources, the atmospheric emissions study prepared for the Governing Council. It covers emissions from coal-fired power plants; industrial emissions (e.g., waste combustion, non-ferrous metals and cement production); artisanal gold-mining use and emissions; and use of mercury in products and processes. Its conclusions are that, excepting the current situation in China, mercury mining is not essential. It also demonstrates that the mercury market reaches an equilibrium of supply and demand following major changes such as the closure of mercury mines in 2003 and 2004.

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[a] An updated version of this report is available in document UNEP(DTIE)/Hg/INC.1/INF/8, in English only.

I. Report on the major mercury-containing products and processes, their substitutes and experience in switching to mercury-free products and processes, July 2008 (UNEP(DTIE)/Hg/OEWG.2/7/Add.1, available in all six official United Nations languages at mercuryconvention.org/Negotiations/OEWG2/tabid/3432/Default.aspx)

18. The report provides information on mercury-containing products and processes that have effective substitutes, including information on the relative quantities of mercury used and on experience in switching to non-mercury processes or products. The report discusses three categories of products: those for which alternatives are successfully used; those for which alternatives are available but face challenges to their use; and those for which the feasibility of alternatives varies significantly as the result of a number of economic, technical, social and institutional factors.

J. Assessment of Excess Mercury in Asia, 2010–2050, May 2009 (available in English at www.unep.org/chemicalsandwaste/Portals/9/Mercury/Documents/supplystorage/Assessment%20of%20Excess%20Mercury%20in%20Asia%202010-2015_Final%20Draft_May%202009.pdf)

19. In accordance with the scenarios assessed in the report, mercury supply and demand in Asia are projected to reach a rough equilibrium beginning during the period 2014–2015. After 2017, the urgency of an Asian mercury storage capability is likely to depend on the rate of demand reduction. Substantial excess mercury can be expected in Asia after 2030. The quantity of excess mercury, mostly accumulated between 2030 and 2050, would likely amount to just over 5,500 tons. In accordance with an alternative policy scenario, in which regional authorities may decide to move forward the storage of excess mercury, the quantity of mercury accumulated may be as high as 7,500 tons.

K. Assessment report: Excess mercury supply in Latin America and the Caribbean, 2010–2050, July 2009 (available in English at www.unep.org/chemicalsandwaste/Portals/9/Mercury/Supply%20and%20Storage/LAC%20Mercury%20Storage%20Assessment_Final_1July09.pdf)

20. The future principal sources of mercury in the Latin American and Caribbean region were identified as that recovered as a by-product of mining operations and that recovered from the closure or conversion of mercury cell chlor-alkali plants. A base case scenario suggests that mercury supply may exceed demand as early as 2015, with the total excess arising between 2015 and 2050 possibly amounting to over 8,000 tons. According to an alternative minimum storage scenario, in which it is assumed that some by-product mercury continues to be exported and that there is a generally slower increase in the generation of by-product mercury, the quantity of mercury accumulated may be closer to 2,000–3,000 tons.

L. Assessment report: Excess mercury supply in Eastern Europe and Central Asia, 2010–2050, April 2010 (available in English at www.unep.org/chemicalsandwaste/Portals/9/Mercury/Documents/supplystorage/EECA%20Excess%20Mercury_Final%20Draft_Apr2010.pdf)

21. The study attempts to understand the dynamic flux between mercury supply and demand in the Eastern Europe and Central Asia region. Current and future regional supply of mercury includes the continued mining of mercury, the occasional decommissioning of chlor-alkali facilities, the recovery of mercury from used products and wastes, mercury by-product from other mining operations and natural gas production, and the increasing use of mercury-free alternatives. This is compared with the regional demand in order to estimate the quantity of excess mercury which may need to be stored in the region.

M. Options Analysis and Feasibility Study for the Long-Term Storage of Mercury in Latin America and the Caribbean, October 2010 (available in English at www.unep.org/chemicalsandwaste/Portals/9/Mercury/Documents/supplystorage/Final_Draft_LAC%20Hg%20Options_Chile.pdf)

22. The report analyses the options for storing surplus mercury in Latin America and the Caribbean using a multi-criteria approach. Three options were considered: above-ground warehousing; below-ground storage in geological formations; and export. While permanent options are being investigated, interim measures including temporary storage, such as in hazardous waste facilities, are necessary for the environmentally sound storage of mercury.

N. Analysis of options for the environmentally sound management of surplus mercury in Asia and the Pacific, September 2011 (available in English at www.unep.org/chemicalsandwaste/Portals/9/Mercury/Documents/supplystorage/Analysis%20of%20options%20for%20the%20environmentally%20sound%20management%20of%20surplus%20Hg%20in%20AP%20R2.pdf)

23. The report analyses the options to remove surplus mercury from the market. The United States of America concept of storing elemental mercury above ground and the European Union approach of underground disposal of hazardous wastes are both technically promising, but their feasibility needs to be assessed on a site-specific basis. While permanent options are being investigated, interim measures including temporary storage, such as in hazardous waste facilities, are necessary for the environmentally sound storage of mercury.

O. Technical and Economic Criteria for Processing Mercury-Containing Tailings, April 2010 (available in English at www.unep.org/chemicalsandwaste/Portals/9/Mercury/Documents/PartneshipsAreas/Technical%20and%20economic%20criteria-2010.pdf)

24. The report includes a technical report identifying key parameters for the assessment of technical and economic opportunities for the processing of mine tailings with high levels of mercury; a description of sampling and analytical approaches for metal analysis; discussion of technical and economic aspects to be considered, taking into account the need to minimize the release of mercury into the environment; and a description of the situation and outline of possible options for a selected site in Chile.

P. Management of Mercury and Mercury-Containing Waste: Final Project Report, June 2010 (available in English at www.unep.org/chemicalsandwaste/Portals/9/Mercury/Documents/supplystorage/Final%20Report%20Mercury%20waste%20project_2010.pdf)

25. The five-country project on mercury waste management was implemented from 5 November 2008 until 30 June 2010. The project included four countries – Burkina Faso, Cambodia, Pakistan and the Philippines – that were financed by the Government of Norway. The participation of Chile was made possible with funds from the Mercury Trust Fund. This project deals with the management of mercury and mercury-containing waste and will contribute to the United Nations Environment Programme (UNEP) priority area on harmful substances and hazardous wastes under its medium-term strategy with the ultimate goal of minimizing the impact of harmful substances and hazardous wastes to the environment and human beings.

Q. Study on the possible effects on human health and the environment of the trade of products containing lead, cadmium and mercury in Latin America and the Caribbean, Asia and the Pacific and Africa (available at www.unep.org/chemicalsandwaste/Metals/LeadandCadmium/Publications/Tradestudies/tabid/6172/Default.aspx)

26. UNEP has prepared, with financial support from the Nordic Council of Ministers and the assistance of Grupo GEA (Peru) and the International POPs Elimination Network, studies on the analysis of the trade flows and review of environmentally sound management practices related to products containing lead, cadmium and mercury in Latin America and the Caribbean and in Asia and the Pacific. These studies were presented to the UNEP Governing Council/Global Ministerial Environment Forum at its twenty-sixth session, held in Nairobi in February 2011, as documents

UNEP/GC.26/INF/11/Add.3 and UNEP/GC.26/INF/11/Add.4, respectively. In 2008, with the financial support of the Government of Sweden, UNEP had conducted a study on the possible effects on human health and the environment in Africa of the trade of products containing lead, cadmium and mercury, which was noted by the UNEP Governing Council/Global Ministerial Environment Forum at its twenty-fifth session in February 2009.

R. Overarching Framework: UNEP Global Mercury Partnership, June 2009 (available in all six official United Nations languages at www.unep.org/chemicalsandwaste/Mercury/GlobalMercuryPartnership/tabid/1253/Default.aspx)

27. The Overarching Framework guides the work of the UNEP Global Mercury Partnership. It has been developed under the auspices of the Executive Director in consultation with Governments and other stakeholders. The document was forwarded to the Governing Council at its twenty-fifth session where progress made by the Partnership was welcomed and the continued involvement of UNEP in the Partnership was endorsed.

S. Analysis of formalization approaches in the artisanal and small-scale gold mining sector based on experiences in Ecuador, Mongolia, Peru, Tanzania and Uganda, June 2012 (available in English at www.unep.org/chemicalsandwaste/Portals/9/Mercury/Documents/ASGM/Formalization_ARM/Formalization%20Document%20Final%20June%202012.pdf)

28. The document is a synthesis for policymakers and other interested stakeholders on the formalization of the artisanal and small-scale gold mining sector, based on the analysis of the case studies developed by international experts for Ecuador, Mongolia, Peru, Tanzania and Uganda and drawing upon examples from other countries. The goal of the document is to highlight critical elements of formalization processes, including institutional considerations, legislation development or reform, and financing. The analysis identifies key strategic lessons and recommendations, which inform the debate, and lessons learned that may be applicable in other countries.

T. Reducing Mercury Use in Artisanal and Small-scale Gold Mining: A practical guide, June 2012 (available in English, French and Spanish at www.unep.org/chemicalsandwaste/Mercury/GlobalMercuryPartnership/ArtisanalandSmallScaleGoldMining/Reports/tabid/4489/language/en-US/Default.aspx)

29. The document has been produced with a view to sharing information with policymakers, miners and civil society about available technologies and approaches for reducing, and ultimately eliminating, mercury use in artisanal and small-scale gold mining (ASGM). It is rich in graphics with the aim of being a simple educational and planning tool for improving practices in ASGM. It is also hoped that the public will find parts of this booklet an accessible and informative resource with which to learn more about the often misunderstood ASGM sector.

U. Environment for Development Perspectives: Mercury Use in Artisanal and Small-scale Gold Mining, August 2011 (available in English at www.unep.org/chemicalsandwaste/Portals/9/Mercury/Partners/Environment%20for%20Development%20Perspectives%20Mercury%20Use%20in%20ASGM%20FINAL.doc)

30. The paper provides a synthesis of existing knowledge to frame the economic argument for investing in mercury reduction/elimination in artisanal and small-scale gold mining as part of development strategies for this sector. The objective is to provide an analytical foundation including often omitted negative external consequences for concurrent and future studies conducted under the Global Mercury Partnership. The aim is to identify the economic challenges and opportunities for reducing mercury in artisanal and small-scale practices, with the goal of eliminating its use wherever possible. This approach ultimately seeks to motivate greater political, private sector and civil society support for significant reduction or elimination of mercury in artisanal and small-scale gold production.

V. Economics of Conversion to Mercury-Free Products, October 2011 (available in English at http://www.unep.org/chemicalsandwaste/Portals/9/Mercury/UNEP%20Economics%20of%20Conversion%20to%20Mercury-free%20Report%20Final%20102611_finaldraft_wAPP.pdf)

31. The report takes into consideration the case studies of two firms involved in the transitioning from mercury-containing to mercury-free products in the medical technology industry. Despite the different supply chain locations of the firms, both were able to produce mercury-free products of the same quality as mercury-containing products. These products included hearing aid batteries, thermometer batteries and most sphygmomanometer applications. However, due to a lack of a legally binding agreement, the study concludes that producers willing to invest in the production of mercury-free devices are also required to continue producing mercury-containing products. This scenario decreases competition for innovation amongst mercury-free suppliers, prevents firms willing to invest in the sector from reaching economies of scale at a faster pace and ignores the fact that sufficient mercury-free capacity exists to meet consumer demand. Legislation and increased market demand would facilitate the shift to mercury-free products.

W. A guide for managing mercury waste at household and community level, August 2011 (available in English at www.unep.org/chemicalsandwaste/Portals/9/Mercury/2011.10.24-Brochure-English.pdf)

32. The brochure was developed by the Foreign Economic Cooperation Office of the Chinese Ministry of Environmental Protection for UNEP, supported by the Government of Norway through UNEP. As a large mercury producer and consumer, the Chinese Government has carried forth national and international efforts to reduce mercury pollution. The development of the awareness-raising toolkit was part of a project that included pilot dissemination, assessment and project summary evaluation. The project concluded that the public has very limited basic knowledge about mercury pollution and is in urgent need of large-scale, targeted and systematic publicity and education.

X. Research and Development Progress of and Feasibility Study Report on Mercury-free Catalyst in China, December 2011 (available in English at http://www.unep.org/chemicalsandwaste/Portals/9/Mercury/VCM%20Production/Final%20technical%20report-VCM%20R&D%20project%202012-3-22.doc)

33. Vinyl chloride monomer production using the mercury catalyst process is the second-largest demand sector for mercury globally (estimated at 570–800 tons annually in 2008). The process has emerged as a cost-effective production technique for countries with a higher availability of acetylene over ethylene as raw material (namely in China and Russia). It is believed that China represents 80–90 per cent of global capacity with 89 facilities currently identified. China undertook this report with support from UNEP as a means to promote cost-effective mercury-free PVC production processes.

Y. Process Optimization Guidance (POG) for Reducing Mercury Emissions from Coal Combustion in Power Plants (report and software, available in English, Chinese and Russian at http://unep.org/chemicalsandwaste/Mercury/GlobalMercuryPartnership/Coalcombustion/ProcessOptimizationGuidanceDocument/tabid/4873/Default.aspx)

34. The POG is a tool that has been developed to help determine appropriate approaches to control mercury emissions in individual coal fired power plants. Though the POG has been developed for coal fired power plants, it is generally also applicable to large industrial coal-fired boilers. It is available in English, Chinese and Russian. The POG summarizes mercury emission reduction practices and technologies including:

- energy efficiency improvement measures
- pre-combustion control measures (e.g., coal blending, coal cleaning)
- optimizing other (single) air pollutants control technologies to maximize mercury removal
- mercury-specific control technologies
- multi-pollutant control technologies

35. The POG has been reviewed by experts in the network of the UNEP Coal Combustion Partnership area, including national experts in Russia, China and South Africa, and others through an open review process.

36. The POG has been further developed into user-friendly freeware, the Interactive Process Optimization Guidance (iPOG™), that calculates Hg emission rates from coal-fired utility plants burning any single coal or coal blend. The software requires the entry of data on coal properties, burning conditions and flue-gas cleaning configuration and conditions. With this information, the iPOG™ calculates Hg emission reductions that can be achieved with different coal pretreatments (washing and blending); with the most common pollution controls, including systems with only particle collection devices and with various combinations of pollution controls (ESP/FGD and SCR/ESP/FGD); and with Hg specific controls such as injection of conventional carbon sorbents, brominated carbon sorbents, and oxidising agents. The iPOG™ also calculates the Hg captured in the bottom and fly ashes, depending on the coal characteristics and combustion conditions (no plant emits 100% of the mercury in coal).

Z. Report on Overall Progress of the United Nations Environment Programme Global Mercury Partnership, July 2010 – June 2012 (available in English at www.unep.org/chemicalsandwaste/Portals/9/Mercury/Meeting%20Report%20PAG%204.doc)

37. The report, on overall progress of the United Nations Environment Programme Global Mercury Partnership, was developed by the UNEP Global Mercury Partnership Advisory Group and reflects input received from within the partnership areas. It considers the future direction of the Partnership and provides an overview of the status and scope of the partnership areas.

AA. Global Chemicals Outlook: Towards Sound Management of Chemicals. Synthesis Report for Decision Makers, September 2012 (available in the six official United Nations languages at www.unep.org/chemicalsandwaste/UNEPsWork/Mainstreaming/GlobalChemicalsOutlook/tabid/56356/Default.aspx)

38. The synthesis report for decision makers describes the main findings and conclusions of the full report "Global Chemicals Outlook: Towards Sound Management of Chemicals." The report was developed by UNEP in collaboration with the World Health Organization. It was also developed in collaboration with the Organization for Economic Cooperation and Development and other member institutions of the Inter-Organization Programme for the Sound Management of Chemicals and reflects the work of the Global Chemicals Outlook Steering Committee, which is composed of representatives of Governments, the private sector, civil society and academia.

BB. Promoting the 'phase down' Approach of Dental Amalgam in Developing countries – final report, October 2015 (available as a brochure at http://www.unep.org/chemicalsandwaste/Portals/9/Mercury/Products/dental%20mercury%20phase%20down%20project%20brochure%20FINAL_lr.pdf)

39. This report presents the work conducted by UNEP and WHO in collaboration with the World Dental Federation (FDI) and the International Association of Dental Manufacturers to implement a demonstration project for phasing down the use of dental amalgam in Tanzania, which was part of the larger East African Dental Amalgam Phase-down Project (EADAP) also conducted in Kenya, Tanzania and Uganda. It included a study on trade flows of dental amalgam and its alternatives, capacitated dentists on the use of alternatives to amalgam for dental restorations and investigated dental amalgam waste practices. Best management practices for dental amalgam were demonstrated for the 3 countries, and weaknesses in the current safety and management practices were highlighted.

CC. Replacing mercury-added products and promoting improved management of mercury-added products waste in Madagascar, March 2015 (available in English at http://www.unep.org/chemicalsandwaste/Portals/9/Mercury/Products/Madagascar-final-report.pdf)

40. This report presents the efforts of the Government of Madagascar to identify mercury-containing products available in the country, investigate their trade and highlight their mercury-free alternatives. The project also focused on awareness raising and advocacy on mercury action. Moreover, the project sought to help Governments to control the imports of mercury-containing

products in line with the provisions of the Minamata Convention, and to strengthen the capacity at the national level for the environmentally sound management of mercury waste.

DD. The United Nation's Framework Convention on Climate Change and the Minamata Convention on Mercury: A comparison for the coal combustion sector, May 2015 (available in English at http://www.unep.org/chemicalsandwaste/Portals/9/Mercury/Report%20FINAL%20-%20UNFCCC-Minamata%20-%20coal%20combustion%208%20June%202015.pdf)

41. This report compares how the UNFCCC and the Minamata Convention seek to control their respective pollutants and the implications of these approaches for the coal combustion sector. The aims and modalities of the two conventions are juxtaposed and mutual benefits of the actions under the two conventions are explored, as are areas of potential bridge building. The report pays special attention to the need for technological advancements to reduce greenhouse gas and mercury emissions from coal combustion sector in light of a growing global demand for coal, especially in developing economies.

EE. Reducing demand for mercury added products in Bangladesh, December 2015 (available in English at http://www.unep.org/chemicalsandwaste/Portals/9/Mercury/Products/Final%20Report-%20ESDO%20Bangladesh_mercury%20substitution.pdf)

42. This report presents an inventory of mercury emissions and releases in Bangladesh and its efforts to reduce demand of mercury added products by developing awareness materials for policy makers and the general public.

FF. Practical Sourcebook on Mercury Waste Storage and Disposal, UNEP, September 2015 (available in English at http://www.unep.org/chemicalsandwaste/Portals/9/Mercury/Waste%20management/Sourcebook/Sourcebook-Mercruy-FINAL-web-.pdf)

43. The 'Practical Sourcebook on Mercury Waste Storage and Disposal' is an informative tool that aims to enhance capacities of governments and other relevant stakeholders, in particular from developing countries and countries with economies in transition, to store and dispose mercury wastes in an environmentally sound manner. The Sourcebook is a practical reference document, rather than a detailed technical guidance, illustrating the various options and technologies available on mercury waste management for decision-makers. It is based on experiences and lessons learnt and contains decision trees, flow charts, photos and a number of case studies. These will help the reader to make informed decisions against the background of their particular domestic circumstances

GG. Website on ASGM National Action Plan Guidance, UNEP Global Mercury Partnership (available in English at http://www.unep.org/chemicalsandwaste/Mercury/GlobalMercuryPartnership/ArtisanalandSmall-ScaleGoldMining/Reports/NationalActionPlan/tabid/53985/Default.aspx)

44. This website provides up to date information and guidance from the UNEP Global Mercury Partnership on developing and implementing the ASGM National Action Plan (NAP) required of certain Parties of the Minamata Convention under Article 7. The most current version of the Partnership's Guidance Document on developing ASGM NAPS can be found here. In addition, other resources such as the Partnership's Quickstart Guide and NRDC's guide to applying for GEF funding can be found on the site. As the Partnership continues to develop resources to support ASGM NAPs, more material will be uploaded onto the site.